President.

PROCEEDINGS

OF THE

Natural Gas Association of America

TWELFTH ANNUAL MEETING

HELD AT

The Broadway Auditorium, Buffalo, New York

May 15th, 16th and 17th, 1917

Published by the Association
Edited by the Secretary.

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COLUMBUS, OHIO
1917

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OF THE

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TWELFTH ANNUAL MEETING

OF THE

Natural Gas Association of America

HELD

MAY 15th, 16th and 17th, 1917

PROCEEDINGS

FIRST DAY — MORNING SESSION.

TUESDAY, MAY 15, 1917.

The Twelfth Annual Meeting of the Natural Gas Association of America convened at The Broadway Auditorium, Buffalo, New York, at 10 o'clock, A. M., May 15th, 1917, with Joseph F. Guffey, of Pittsburgh, Pa., as President, and Thomas C. Jones of Delaware, Ohio, as Secretary.

The following members reported their attendance:

ABBOTT, C. G.
ADAMS, C. H.
ADAMS, W. H.
ADAMS, W. N.
ADOLPH, PETER
AGGERS, E. W.
ALBERTY, P. A.
AMEY, L. C.
ANDERSON, E. L.
ANGEL, JOSEPH E.
ARMSTRONG, A. A.
ARNOLD, W. H.
ARRAS, W. H.
ASHLEY, WALTER A.
AYER, J. W.
BAGLEY, W. H.
BAHAN, J. R.
BAKER, A. G.
BALDWIN, O. M.
BALLARD, A. N.
BALLARD, H. O.
BARGER, L. F.
BARNES, R. B.
BARTLETT, E. O.

Bartlett, J. C.
Bartlett, R. H.
Bartley, E. L.
Bass, W. H.
Beatty, D.
Bell, Chas. D.
Benner, George K.
Benninger, H. H.
Benninger, R. E.
Berger, C. O.
Berry, Dr. R. N.
Berry, C. P.
Berwald, P. M.
Bieler, O.
Bigelow, L. S.
Billingsley, J. E.
Bishop, Harry W., Jr.
Black, T. M.
Blackall, T. P.
Blake, E. F.
Blauvett, W. S.
Blewett, John T.
Booth, Arthur
Booth, George
Boothe, R. E.
Borchard, C. E.
Boyle, S. C.
Braden, G. T.
Braden, H. W.
Bradford, F. J.
Brady, M. A.
Bradley, Harry
Bradley, J. B.
Bragdon, H. K.
Brandel, S. F.
Brennan, H. W.
Brinham, A. L.
Brink, G. R.
Brink, R. W.
Broder, W. J.
Brooks, R. A.
Brown, D. J.
Brown, L. A.
Brown, L. E. H.
Brown, W. L.
Brown, W. Re.
Bruckner, O. L.
Brunner, E.
Bullock, Charles L.
Bullock, George
Bullock, W. E.
Burkhalter, R. J.
Burr, R. B.
Burnett, Jerome
Burress, George H.
Burson, H. W.
Butler, C. L.
Cain, W. J.
Callahan, J. T.
Campbell, Jos. T.
Carey, W. C.
Carpenter, Everett
Carl, L. F.
Carter, Clarence E.
Cartwright, W. Y.
Case, L. L.
Casto, A. T.
Clark, C. L.
Clark, James
Clarkson, R. L.
Clawson, T. B.
Cleary, J. D.
Clemens, Hays H.
Clifford, T. C.
Clover, J. N.
Clover, M. K.

Clover, S. C.
Collins, Frank
Collings Hugh
Collins, James
Connors, E. F.
Connors, J. P.
Coolahan, P. J.
Corrin, John B.
Covey, A. F.
Courtney, D. H.
Coyle, Henry
Craft, Chas.
Crahan, B. J.
Craig, W. P.
Cramer, C. W.
Cratty, James M.
Crawford, G. W.
Crawford, J. B.
Creveling, Joe D.
Cronin, John H.
Crosby, G. A.
Cross, Raymond
Crossett, John
Crowl, P. E.
Crowley, P. J.
Cullinan, M. P.
Cummings, C. W.
Cummings, Con.
Cummings, E. A.
Cunningham, R. H.
Cusack, Frank
Cusack, W. M.
Cushing, J. W.
Custer, Z. B.
Daily, Eugene
Daly, M. B.
Davies, W. N.
Davis, A. P.
Davis, H. R.
Davison, M. C.
Deal, E. O.
Deemer, F. C.
Denton, D. T.
DeWitt, B. C.
Diescher, A. J.
Dimmick, W. H.
Dittman, C. E.
Dittman, D. M.
Ditto, Wm. A.
Dixon, Philip
Dooling, F. T.
Donnelly, J. S.
Donnelly, W. E.
Donohue, T. C.
Donovan, B. H.
Doty, W. J.
Dougherty, O. J.
Douglass, S. M.
Dowd, B. F.
Downing, G. W.
Dreher, Ray G.
Dresser, Carl K.
Drury, G. F.
Dunn, T. A.
Eagan, E. J.
Eastland, S. H.
Engle, T. W.
Ernst, H. M.
Evans, J. J.
Ewing, A. M.
Fair, F.
Fairchild, F. A.
Falk, George E.
Farner, J. W.
Fay, Peter
Felix, O. F.

Fessler, T. A.
Finley, H. F.
Fish, Harvey
Fisher, F. P.
Fisler, John
Flanigan, J. T.
Fleming, A. C.
Fleming, George F.
Flinn, T. W. H.
Flint, R. B.
Fogarty, John E.
Foley, J.
Foley, T. H.
Fonner, J. H.
Forman, H. A.
Foster, J. E.
Fralick, F. A.
Fray, Sam
Frazier, J. E.
Freidenberg, D.
French, F. A.
Frevert, R. A.
Frey, Wm. B.
Frohreib, L. C.
Fuller, E. K.
Fulsom, H.
Fyfe, A. D.
Fye, J. L.
Gage, W. P.
Gale, G. N.
Gallagher, C. E.
Gallagher, R. W.
Garard, Chas. H.
Garard, J. M.
Gardner, C. W.
Gassdorf, G. I.
Gassett, A. L.
Gates, C. B.
Gavin, A. W.
Geigel, F. G.
Gericke, Oscar C.
Gessel, B. M.
Gifford, B. J.
Gill, F.
Gillogly, J. J.
Gindele, A. H.
Glass, John
Glass, R. C.
Gleason, C. W.
Goble, Ben. F.
Goff, George S.
Grace, C. H.
Graham, Lyman L.
Grant, C. E.
Gray, Homer R.
Gray, J. F.
Greis, Henry N.
Gribble, Wallace B.
Guffey, J. F.
Gurnsey, W. M.
Hackstaff, J. D.
Hackstaff, R. C.
Hadley, F. L.
Hadley, W. R.
Hagan, W. G.
Hager, H. A.
Hall, H. E.
Hall, Henry G.
Hall, J. J.
Hall, T. A.
Hammon, M. A.
Hanks, J. G.
Hanley, T. E.
Hannon, D. W.
Harney, Jr. H.
Harrington, H. H.

Harris, G. S.
Hartzell, A. C.
Harwood, J. Arch.
Hastings, A. L.
Hastings, William
Hawk, C. M.
Hawkins, B. L.
Hay, R. W.
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Higgins, W. C.
Hill, Chas. E.
Hill, D. M.
Hinerman, G. L.
Hoffman, H. R.
Hogg, H. B.
Holland, H. T.
Holly, Wm.
Holtz, W. H.
Hoover, H. J.
Hornor, Boyd E.
Hornor, Lynn S.
Horsley, George H.
Hottinger, R. L.
Hovis, W. A.
Howard, J. V.
Howard, W. C.
Huff, Charles F.
Hull, H. D.
Hunter, W. E.
Hurd, F. R.
Hurlburt, A.
Hutchinson, F. R.
Hutchinson, W. P.
Irwin, J. W.
Irwin, R. W.
Isherwood, J. H.
Ivory, E. D.
Jacoby, H. L.
Johnson, C. W.
Johnson, Frank
Johnson, Paul R.
Johnson, Roswell H.
Jones, C. R.
Jones, E. T.
Jones, George H.
Jones, T. C.
Jones, T. J.
Jordan, George E.
Judge, W. J.
Keenan, J. E.
Kellogg, E. B.
Kellogg, F. L.
Kennedy, H.
Kerr, A. N.
Kerr, T. H.
Kilpatrick, R. B.
Kightlinger, A. D.
King, James
Kiesel, Charles
Klise, John J.
Knapp, F. H.
Knight, W. H.
Knowles, W. R.
Kohl, W. G.
Krause, Chas.
Krick, Kay C.

Lackey, Frank
Landis, H. K.
Lakamp, J. H.
Larkin, Leo.
Larkin, W. H.
Laughlin, J. P.
Law, C. H.
Layton, Miles B.
Leamon, Wm. G.
Lee, T. M.
LeFevre, Harry E.
Lehman, I. L.
Leight, Harry G.
Leland, E. D.
Leland, R. M.
Leonard, W. A.
Lepper, E. L.
LeRoy, Frank O.
Leslie, Fred C.
Little, Perry A.
Lindsay, Roy
Lohr, G. C.
Longnecker, W. C.
Loveland, Elmer
Loveridge, Guy H.
Lowry, F. M.
Luebecker, Paul
Lutz, C. H.
Lynch, J. D.
Lytle, V. H.
McCalmont, C. P.
McCandless, H. E.
McCandless, Harry M.
McCann, G. E.
McCarthy, F. R.
McClellan, Arthur
McClellan, J. Y.
McClellan, Joseph
McClintock, C. A.
McCloy, W. L.
McCluney, S. F.
McCormick, E. J.
McCormick, L. K.
McCollough, G. W.
McCrimmon, J. E.
McDowell, C. O.
McDowell, J. C.
McHenry, M. A.
McIntyre, M.
McKee, George R.
McKimmie, J. E.
McKinney, Charles B.
McKnight, S. C.
McMahon, D. P.
MaMahon, James W.
McMahon, John
Mc Mahon, John J.
Mc Millan, John.
McNary, John B.
McPherson, Edwin A.
Magrew, B. A.
Mahoney, John T.
Mallory, L. E.
Marckworth, W. C.
Maroney, Joseph.
Marquis, H. H.
Marriott, W. J.
Marston, Edgar.
Martin, Edw. P.
Martin, F. W.
Martin, Henry.
Martin, J. O.
Mason, Alphonso.
Mason, J. F.
Matson, J. R.
Maxon, J. H.

May, A. G.
Merrill, Edwin C.
Metz, Eugene
Meyer, F. J.
Mickley, M. A.
Miller, D. F.
Miller, Fred A.
Miller, John A. W.
Milne, E. D. S.
Milne, W. E.
Minken, George
Moeller, W.
Montgomery, J. H.
Montgomery, M. D.
Moore, Calvin T.
Moore, Edgar M.
Morgan, W. J.
Mowrey, John.
Munro, W. Lorne.
Murphy, S. F.
Murray, M. J.
Myles, Fred W.
Nash, A. W.
Near, C. J.
Neely, Ira L.
Neely, L. G.
Nelson, H. E.
Nestor, J. F.
Newman, A. J.
Newton, N. A.
Norris, H. S.
Norton, Charles L.
Oakes, W. L.
O'Day, J. J.
O'Leary, Dennis.
Oliphant, B. C.
Oliphant, F. H.
Oliver, C. E.
Olmstead, J. F.
O'Neill, Charles.
Ostermaier, John.
Ostrye, Peter L.
Painter, J. C.
Palm, Charles J.
Paris, Jr., A. J.
Parks, R. N.
Parr, A. T.
Pattinson, R. L.
Pearson, C. A.
Penhale, J. W.
Philips, D. H.
Phillips, C. C.
Philips, H. T.
Porterfield, Harry.
Pratt, Charles E
Presho, A. A.
Prill, H. M.
Pryor, F. B.
Quinlan, Thomas.
Rae, A. B.
Ralph, Charles A.
Ramage, J. R.
Ramsey, E. C.
Rand, J. R.
Redic, Sam.
Reed, Ira B.
Reed, J. A.
Reeser, E. B.
Reeser, H. C.
Reichel, C. D.
Reiley, J. M.
Remler, J. A.
Reiser, Charles, L.
Richards, W. H.
Richie, J. A.
Riley, George N.

Roberts, C. C.
Roberts, M. J.
Robertson, D. S.
Robertson, J. D.
Robinson, Edwin.
Roby, H. P.
Rogers, W. J.
Rooney, E. S.
Rothert, E. R.
Rupp, Chas. H.
Rush, Albert.
Russell, C. H.
Russum, R. C.
Ryan, E. M.
Ryan, J. L.
Saeger, E. L.
Sartorius, F.
Schalek, J. H.
Schatzel, George P.
Schafer, F. J.
Schell, W. F.
Schlaudecker, E. M.
Schlosser, A. J.
Schmidt, E. F.
Schmitt, Frank.
Scoville, J. C.
Scratch, George.
Sears, C. W.
Sedberry, W. H.
Seyffert, L. A.
Shaffer, Hose.
Shannon, O. K.
Shattuck, J. R.
Shaw, S. T.
Shear, Robert.
Shoub, J. F.
Shulters, Hoyt V.
Simmons, W. P.
Sipe, Geo. B.
Sipe, W. E.
Skelly, H. L.
Slack, Chas. W.
Sloan, C. M.
Sloan, C. T.
Sloan, W. L.
Smith, E. B.
Smith, Frank D.
Smith, Frank N.
Smith, H. L.
Snoke, Alpheus.
South, W. H.
Southwick, E. F.
Spain, William H.
Stafford, G. M.
Stearns, J. W.
Stephens, Thomas H.
Sternburg, E. M.
Stewart, S. B.
Stitt, John C.
Stringer, Harrison.
Stone, F. W.
Stotler, R. M.
Stroup, Lloyd.
Stroup, John.
Sullivan, J. H.
Sullivan, P. D.
Taylor, George E.
Teegustram, Victor S.
Terry, L. B.
Texter, L. J.
Thiel, Martin A.
Thomas, F. H.
Thomas, Howard V.
Thompson, W. H.
Thompson, W. P.
Tibbens, W. P.

Tillitson, F. H.
Tomb, F. B.
Tomer, Adam.
Tonkin, J. B.
Tonkin, T. J. Jr.
Topp, A. A.
Tracy, F. B.
Treat, E. M.
Tucker, D. H.
Tucker, T. C.
Tucker, G. C.
Turner, Lyly.
Tyng, Arthur.
Vallely, J. F.
Vance, Geo. B.
Voelkle, L. P.
Walker, W. O.
Wallace, H. A.
Wallace, J. B.
Walsh, D. C.
Walsh, M. W.
Walton, J. D.
Ward, R.
Wardell, C. W.
Watts, Harry P.
Weir, Henry D.
Welker, George E.
Wellman A. Miner
Weymouth, Thomas R
Wheeler, Edw. M.
Whitcomb, E. C.
Whitcomb, E. T.
Wiggins, J. H.
Williams, D. W.
Williams, John B.
Williams, John H.
Willoughby, H.
Willsey, J. H.
Wilson, Henry M.
Wilson, W. E.
Witkowski, F. D.
Wittmer, Thomas
Wonderly, W. V.
Wood, L. S.
Wyer, Samuel S.
York, Patrick
Young, J. H. M.
Young, W. T.
Zimmerman, Charles W.

President Guffey: Gentlemen, it gives me great pleasure to call to order the twelfth annual meeting of the Natural Gas Association of America. It gives me still greater pleasure to introduce as the first speaker at this convention the distinguished mayor of Buffalo, who will extend to this Association the welcome of the city. I now have the pleasure of introducing Mayor Fuhrmann. (Applause).

Hon. Louis P. Fuhrmann, Mayor of the City of Buffalo, then delivered the following:

Louis P. Fuhrmann.

ADDRESS OF WELCOME.

Mr. President and Gentlemen:

I am glad to come here this morning. I want to thank your Committee on Arrangements for their thoughtfulness in inviting me to participate in your proceedings on this occasion. It was kind and gracious of them to do so, and I want them to know that I appreciate it. I want to assure them and everyone of you that I am not here this morning to make an address upon any subject whatsoever, for I realize that you are gathered at this time for the express purpose of transacting important business and not to listen to mere words from me that must necessarily be more or less remote from your main object. However, you have greatly honored Buffalo by your presence, and on behalf of five hundred thousand hospitable and patriotic Buffalonians I extend to each and every one of you a sincere and generous welcome to this great and beautiful city. For Buffalo is a beautiful city, and Buffalo is a great city. It is a great city his-

torically. It is the home city of Millard Fillmore and of Grover Cleveland. It is the city which in 1812 was burned to ashes by British torches and a city which in less than a century has grown from ashes to a City Beautiful, and from a scattered hand-full of people to a mighty Cosmopolitan City of five hundred thousand souls. It is a great city industrially. It is a great city commercially. It is a great city racially. It is composed of almost all the races of the world. American, German, English, Irish, Italian, Polish and all the other bloods representative of the human race; and we are living here at peace with one another, and with feelings of good will for each other. We are tolerant and we are charitable, for we realize there is room enough for all of us and for hundreds of thousands more just like us as soon as we can attract them within our borders.

For the City of Buffalo it may truly be said, once the American Flag goes up, all the other flags come down. (Applause). Wherever the American Flag is unfurled, on land or sea, — on this continent or in Europe, our hearts go with it, and our lives are willingly sacrificed in its defense. (Great applause). That is your spirit, and that is my spirit, and it is the spirit of five hundred thousand Buffalonians, who are part and parcel of the one hundred million Americans who revere the names of George Washington, of Andrew Jackson, of U. S. Grant and of Robert E. Lee. (More applause).

We are now engaged in the greatest of wars since the beginning of time. It is a war that will test and try our souls, as they have never been tested or tried before. Great sacrifices will have to be made by us. Some of us will have to go to the front. Some of us will have to make sacrifices of money. Some of us will have to help in the production of food and of munitions and of ships, but every last one of us must understand that we must do every last thing possible to make the United States and the Allied Nations victorious in this strife and in this struggle for the preservation of the ideals of free government on earth. (Long continued applause).

As you journey throughout our city, you will find that we are second to no other city in respect to those things which go to make up the substantial and the objective features of life, and

it is such a city, gentlemen, that I bid you a hearty welcome to, not only today, but throughout your entire stay in our midst. (Prolonged applause).

PRESIDENT GUFFEY: It gives me great pleasure to introduce one of the former presidents of our Association, the Vice President and General Manager of The Ohio Fuel Supply Company, Mr. Garard, who will reply on behalf of the Association to the eloquent address of welcome by the distinguished Mayor of Buffalo. (Applause).

Mr. John M. Garard of Columbus, Ohio, then delivered the following:

JOHN M. GARARD.

RESPONSE TO ADDRESS OF WELCOME.

Mr. President, The Honorable Mayor of Buffalo, Ladies and Gentlemen (although I do not see any of the former), and Members of the Natural Gas Association of America:

I hope I have not missed anybody—Mr. David O. Holbrook, the President of the Supply Men's Association, wrote me a letter in which he stated that the Honorable Joseph F. Guffey, as President of this Association, had requested me, as the "shining light" of the Association, to respond to His Honor's Address of Welcome. That was very nice of David; but if David had said that the electric wires that run from Niagara struck this Mayor before they got to Buffalo, somebody else would have had my place. (Laughter).

I must say that the Mayor's remarks are well timed, but in justice to myself I want to iterate that I forewarned him, in a manner as to what he should say. (More laughter). I told him that every thing he said in favor of the Natural Gas Association,

and all the bouquets he threw towards them would be put upon our records in large, black-faced type, but as to anything else he said, I did not know whether it would be printed at all. So I think I am the one who urged him on to make a wonderful speech; and he certainly did himself proud. If any of you think it is an easy job to follow him, just come up here and I will yield my place to you in a minute. (More laughter and applause).

Now, I haven't anything to tell you. I haven't any speech. I am just simply here to say that we look upon this as the greatest meeting we have ever had. Excuse me, Brother Guffey, — that is taking some of the honors from Pittsburgh, but I believe it is true nevertheless. I can only say this, that we appreciate having the Honorable Mayor with us; we appreciate his eloquent words of welcome and I can simply add that for all the nice things he has said to us, we will return them tenfold and say to him that we appreciate every thing Buffalo has promised us. I sometimes wonder whether we are not a little premature in responding to these addresses of welcome "right off the bat"! Before the ink is dry on the recording secretary's paper, we rush in and pour out our gratitude for these generous words of hospitality, and yet we oftentimes do not know what is going to happen before we get out of town. I really think the proper thing to do would be to wait until we get home and then write back and tell the spokesman of the City in which we gather, how much, if any, we have enjoyed our visit. I think it would be safer and you know the popular slogan nowadays is "Safety First." (Renewed laughter and applause).

Of course, thus far we have escaped. There has been no monkey-wrench thrown into the gears any place that I know of, or any diaphragm punctured or anything of that kind. But I will tell you—you who were at Oklahoma City will remember we had a "badger fight" there. A gentleman from Buffalo was there. I am not going to mention any names, but he handled the crockery-ware. (Great laughter). I have even felt that he had something in store for us, and that some day, when opportunity presented itself, we would be well paid for it all. Now, I noticed yesterday, when I was out with him in an automobile,

that every time we met a policeman, the policeman bowed to him very obsequiously and smiled, and I am free to admit that I did not like that a durned bit. (More laughter and applause). He seems to be just a little bit too close to these policemen. While I have the most implicit confidence in the Mayor, and I don't believe the Mayor is going to allow him to go too far, but after all, I will be pretty well satisfied when my satchel is packed and at the station. (Renewed applause and laughter).

However, Gentlemen, seriously speaking, you have a lot of papers and reports to dispose of at you morning session, and my talk does not amount to anything. In conclusion, I wish to say to the Mayor, that we appreciate most sincerely your hearty welcome, and we thank you from the bottom of our hearts. (Applause).

MR. L. S. BIGELOW, of Buffalo, N. Y.: Mr. President—

MR. GARARD: No! No! That won't go here! (Laughter).

MR. L. S. BIGELOW: (continuing): Mr. Guffey just nodded to me which gives me the opportunity of answering Mr. Garard, notwithstanding his protestations. It has always been my practice to be the last to speak, in case I wished to speak at all, and I may say that I am very glad of this opportunity to defend myself. I want to tell you that no man in this room,—no man at the meeting in Oklahoma City,—no one of these Indians who were there in full costume and "feathers" enjoyed that badger fight more than the man who "pulled the badger." (Laughter). I pulled the badger. (Renewed laughter). Sitting over there is Fred Mueller, who led me on as he has led many and many a man to destruction. (Continued laughter and applause). I want to say one thing more about the badger business. Mr. Garard spoke of the "crockery-ware." I do not speak of it as "crockery-ware." I speak of it as the "collar." In other words, gentlemen, among my relics at home today, I have the collar and the rope attached to the collar that was attached to the badger. Those of you who were there will recall that the floor of that ninth story of the Lee-Huckens Hotel—this is not an advertisement for the Lee-Huckens,—was a rough concrete floor and the badger broke

loose, but the collar remained intact, tied to the cord, and as I have said before, I have that cord and I have that collar among my most cherished relics at home today, and I shall preserve them for many years to show to my children and my children's children, and to tell to them the Natural Gas Association did me and made me lose all my friends out at Oklahoma City. (Continued laughter and applause).

Now, I want to say this,—as a citizen of Buffalo, and as a member of a family that has lived in Buffalo since Buffalo had one house—my grandfather was in Buffalo when Buffalo had one house—and as a member of this community I want to tell you one other thing. Some of you may not know that this splendid Auditorium you are occupying as an Exhibit Hall and this building you are occupying for a meeting place and will occupy tomorrow night for the beefsteak dinner on the next floor above is tendered to you complete, including light—because this is to be open at night,—building, light, heat, watchman's service and all, with the compliments of the City of Buffalo. Not one cent is being paid by any Association or individual. (Applause).

MR. J. W. McMAHON, of Toledo, Ohio: Mr. President, I wish to present the following resolution (handing same to Secretary Jones).

PRESIDENT GUFFEY: The secretary will please read the resolution.

SECRETARY JONES: (Reading) *Resolved*, That this Association extend most sincere appreciation to the City of Buffalo, to Commissioner Malone, to the Chamber of Commerce, to the Iroquois Natural Gas Company and to those who have assisted us most faithfully at the Auditorium.

We appreciate exceedingly the use of this most adequate and splendid building and its equipment that has been provided with the compliments of the City of Buffalo, also the service that has been rendered individually and collectively.

MR. J. W. McMAHON: I move the adoption of the resolution, Mr. President.

MR. J. M. GARARD: I second the motion.

The above motion, duly seconded, was then unanimously adopted.

MR. J. M. GARARD: Mr. President, I move you, that a vote of thanks by this Association be extended to Hon. Louis P. Fuhrmann, Mayor of the City of Buffalo, for his kindness in participating in our opening exercises and for the eloquent Address of Welcome delivered to us.

MR. MARTIN B. DALY: I second the motion.

The above motion, duly seconded, was then unanimously adopted by a rising vote.

PRESIDENT GUFFEY: Mr. Mayor, the vote is unanimous and we thank you very much. (Applause).

The next regular order of business is the Report of Board of Directors.

Mr. T. C. Jones then read the following:

REPORT OF THE BOARD OF DIRECTORS.

BUFFALO, May 14, 1917.

To the Natural Gas Association:

GENTLEMEN: Your Board of Directors beg leave to submit for your consideration the following recommendations and report:

Nominating Committee: John M. Garard, A. A. Armstrong, Bert C. Oliphant.

Committee on Next Place of Meeting: Kay C. Krick, William B. Way, Ogden K. Shannon.

Auditing Committee: Harry C. Reeser, John B. Tonkin, L. A. Seyffert.

Committee on Memorials: Milt Saul, R. W. Gallagher, C. W. Sears.

Committee on Final Resolutions: William Y. Cartwright, Frederick W. Stone, John G. Pew.

That the following be Released from Membership at their own request: C. G. Abbott, J. A. Adams, Hugh Anderson, J. B. Ardis, C. E. Baker, H. J. Bartley, H. P. Beans, D. J. Beckett, J. B. Black, J. C. Blair, W. Boice, J. Bossert, J. O. Bothel, W. B. Brendlinger, A. B. Burnett, F. G. Burson, O. W. Cashdollar,

J. E. Conley, A. F. Coulter, C. F. Covey, H. Cummings, M. J. Cummings, S. Davis, W. M. Davis, P. E. Dixon, J. P. Eagleson, H. T. Egbert, C. L. Ford, W. W. Hall, C. L. Holman, N. Hunt, J. W. Hunter, W. S. Jewett, R. D. Jolliffe, N. J. Klug, C. Knepshield, C. A. Lawrence, A. Leight, S. E. Leist, C. P. LeVier, W. H. Lockwood, L. Mathieu, H. B. Mayne, J. Y. McClelland, W. A. McCombs, G. W. McCullough, C. McCutcheon, W. H. McFadden, W. F. McGhee, J. F. McKibben, A. G. McPeake, H. Moore, S. T. Murdock, F. C. Murphy, C. O'Hara, L. O'Hara, C. Owens, T. H. Patterson, A. S. Pfeifer, J. Phillips, T. P. Pinckard, P. Plantinga, D. M. Poe, G. B. Reeger, S. C. Ross, D. Sample, W. J. Schiffler, F. F. Schornstein, C. E. Seachrist, J. Seice, C. F. Shaffer, N. G. Sherwood, A. Shoop, C. W. Shulters, Z. H. Shuster, E. D. Sibley, E. Siess, M. C. Smith, R. H. Smith, C. Stainbrook, O. Steele, H. Steinecker, W. E. Steinwedell, H. P. Taylor, N. J. Taylor, H. Tipper, G. J. Vallely, H. VanBlarcom, J. S. Welch, G. C. Wells, R. H. West, R. L. Wilkes, T. B. Wilson, F. W. Wimer, B. Wise, D. A. Wolfe, J. Young, J. A. Fletcher, G. Fonner, P. I. Price and G. W. Zimmerman.

That the following be dropped from Membership for Nonpayment of dues: C. E. Bair, F. Barnes, J. H. Carter, R. Clark, J. W. Dana, R. D. Day, J. R. Doane, C. L. Freeland, T. L. Galvin, E. O. Hickstein, W. C. Higgins, W. T. Hinchey, E. M. Hinshaw, R. Hoover, J. C. Howe, W. Howe, J. H. Howard, L. Katona, B. E. LaDow, C. V. LaDow, W. G. Leet, W. Little, T. E. Lloyd, G. J. Newton, C. W. O'Donnell, T. Pinkston, J. S. Posgate, W. F. Potter, W. W. Rhea, G. Robinson, W. W. Strickler, F. L. Stuchell, R. O. Stull, J. C. Vance, E. S. Vincil, and F. H. Young.

Respectfully submitted for the Board of Directors,

JOSEPH F. GUFFEY,
President.

THOMAS C. JONES,
Secretary.

PRESIDENT GUFFEY: Gentlemen, you have heard the report of the Board of Directors. What is the wish of the Association with regard to it?

MR. J. W. MCMAHON: Mr. President, I move that the Report of the Board of Directors as submitted, be received, ordered placed on file and spread upon the minutes of the Association.

MR. L. C. BIGELOW: I second the motion, Mr. President.

And thereupon the above motion, having been duly seconded, was carried, and the Report of the Board of Directors was received, filed and ordered spread upon the minutes of the Association.

PRESIDENT GUFFEY: I will change the order of business slightly as appears upon the printed program and next call for the Report of the Committee on New Members and Mr. Norris I believe is Chairman of that Committee.

MR. HENRY S. NORRIS, Chairman of the Committee on New Members, then submitted verbally the following:

REPORT OF COMMITTEE ON NEW MEMBERS.

Mr. President and Members of the Natural Gas Association of America:

You have heard the eloquent Address of Welcome by our Honorable Mayor; you have heard the witty and humorous Response by Mr. Garard; you have heard what Mr. Bigelow has had to say with reference to Buffalo, and now, on behalf of the Iroquois Natural Gas Company, one of the greatest Gas Companies in the country, we extend to each of you a hearty and sincere welcome, and a cordial invitation, while in Buffalo, to visit our plant. We have a beautiful new office building and also fine shops and up-to-date equipment and it would give us great pleasure to have each and all of you visit our plant and offices while here and feel assured that what we have to show you will well repay you for the time and trouble expended in such a visit. (Applause).

Mr. President; the Committee on New Members begs leave to report that it has placed in the hands of our Secretary a list

of applications for membership to the number of 262, and the Committee recommends the election of each applicant to membership in this Association.

MR. JOHN M. GARARD: I move that the Report of the Committee on New Members be received, accepted and placed on file and that the Secretary be directed to cast the ballot of the Association for the election to membership in the Association of the applicants recommended in said report.

MR. MARTIN B. DALY: I second the motion.

And thereupon said motion having been duly seconded, was unanimously adopted.

Secretary Jones then cast the ballot of the Association for the election to membership of the applicants whose names were recommended by said Committee and said applicants were duly declared to be members of the Association and were invited to join in the discussions and participate in the proceedings.

The list of applicants recommended and elected to membership in the Association is as follows:

NEW MEMBERS.

C. H. Adams, Field Foreman, United Natural Gas Company, Kane, Pennsylvania.

Peter P. Adolf, Agent, Iroquois Natural Gas Company, Lancaster, New York.

E. W. Aggers, Contractor, F. A. Aggers & Son, Kane, Pennsylvania.

P. A. Alberty, Assistant Superintendent, Logan Gas Company, Columbus, Ohio.

E. J. Anderson, Superintendent, Texas Gas Company, Mexia, Texas.

C. B. Apple, 12518 Clifton Blvd., Lakewood, Ohio.

Thomas Armstrong, Inspector, Iroquois Natural Gas Company, Buffalo, New York.

J. P. Bahan, Clerk, The Texas Company, Natural Gas Department, Shreveport, La.

O. M. Baldwin, Foreman, East Ohio Gas Company, Kent, Ohio.

W. H. Bass, Foreman, Alden-Batavia Natural Gas Company, Alden, New York.

B. R. Bay, Chief Engineer, The Medina Gas & Fuel Co., Mansfield, Ohio.

N. H. Benninger, Superintendent, United Natural Gas Company, South Oil City, Station R, Pennsylvania.

R. E. Benninger, Chief Engineer, United Natural Gas Company, Hallton, Pennsylvania.

C. O. Berg, Foreman, United Natural Gas Company, Reynoldsville, Pennsylvania.

Dr. R. N. Berry, Contractor, Dominion Natural Gas Company, Caledonia, Ontario.

O. Bicler, Salesman, Westinghouse Electric & Mfg. Co., Pittsburgh, Pennsylvania.

T. P. Blackall, Regulator Inspector, Iroquois Natural Gas Company, Buffalo, New York.

B. F. Blake, Chief Engineer Treat Compr. Sta., The Ohio Fuel Supply Company, Homer, Ohio.

Warren S. Blauvelt, Consulting Engineer, Steere Engineering Co., Detroit, Mich.

John T. Blewett, General Inspector, Iroquois Natural Gas Co., Buffalo, New York.

C. E. Borchard, Accountant, Dominion Natural Gas Co., Ltd., Buffalo, New York.

J. B. Bower, Manager, Central Pipe Line Co., Alymer, Ontario, Canada.

Hugh T. Boyd, Chemist, The Ohio Fuel Supply Company, Homer, Ohio.

E. R. Boyle, Manager, Oil City Derrick, Oil City, Pa.

M. A. Brady, Foreman, Tri County Natural Gas Co., Caledonia, New York.

H. K. Baldwin, Secretary to General Manager, Philadelphia Company, Pittsburgh, Pennsylvania.

S. F. Brandel, Foreman, Peoples Natural Gas Company, Gardenville, New York.

H. W. Brennan, Foreman, The Texas Company, Moran, Texas.

A. L. Brinham, Clerk, Union Natural Gas Corp., Pittsburgh, Pennsylvania.

R. A. Brooks, Secretary and Treasurer, The Medina Gas & Fuel Co., Mansfield, Ohio.

L. E. H. Brown, Field Superintendent, Potter Gas Company, Roulette, Pennsylvania.

L. H. Brown, Assistant Engineer, Iroquois Natural Gas Company, Buffalo, New York.

O. L. Bruckner, Agent, Logan Natural Gas & Fuel Company, Westerville, Ohio.

E. Brunner, Engineer, Hope Eng. and Supply Company, Mt. Vernon, Ohio.

George Bullock, Foreman, Southern Ontario Gas Company, Ltd., Rodney, Ontario, Canada.

Jerome B. Burnett, Chief Oklahoma Division, Empire Gas & Fuel Co., Bartlesville, Oklahoma.

Geo. H. Burress, Geologist, Empire Gas & Fuel Co., Bartlesville, Oklahoma.

C. L. Butler, Accountant, Dominion Natural Gas Company, Ltd., Buffalo, New York.

W. J. Cain, Division Foreman, East Ohio Gas Company, Cuyahoga Falls, Ohio.

Gordon M. Campbell, Commercial Department, Union Light, Heat & Power Co., Covington, Kentucky.

W. C. Carey, Foreman Meter Repairs, Iroquois Natural Gas Co., Buffalo, New York.

L. F. Carl, Agent, The Newark Natural Gas & Fuel Company, Newark, Ohio.

L. L. Case, Local Agent, Ontario Gas Co., Holcomb, N. Y.

Fred N. Chambers, Oil Producer, Chambers Oil Company, 214 Chambers Bldg., Oil City, Pennsylvania.

C. L. Clark, Foreman, Iroquois Natural Gas Co., Bradford, Pennsylvania.

T. B. Clawson, Supt., Warren & Chaut. Gas Co., Warren, Pennsylvania.

J. D. Cleary, Agent, Iroquois Natural Gas Company, Angola, New York.

J. N. Clover, President, The Iron Mountain Oil Company, Tulsa, Oklahoma.

S. C. Clover, The Iron Mountain Oil Company, Tulsa, Oklahoma.

Eugene F. Connors, Guffey Gasoline Company, Bradford, Pennsylvania.

Jos. P. Conners, Cashier, Iroquois Natural Gas Co., Buffalo, New York.

P. J. Cookhan, Superintendent, Berea Pipe Line Company, Cleveland, Ohio.

Frank Cosan, Land Department Clerk, Dominion Natural Gas Company, Buffalo, New York.

D. A. Coste, Treasurer, Provincial Natural Gas & Fuel Company, Niagara Falls, Ontario.

James M. Cratty, Foreman Meter Department, Pennsylvania Gas Company, Jamestown, New York.

Joe D. Creveling, Construction Engineer, Logan Natural Gas & Fuel Company, Columbus, Ohio.

P. E. Crowl, Agent, Potter Gas Company, Galeton, Pennsylvania.

Harry C. Culp, Salesman, Ingersoll Rand Co., Cleveland, Ohio.

E. A. Cummings, Assistant Treasurer, Moncton Tramways, Electricity & Gas Co., Ltd., Moncton, New Brunswick, Canada.

J. W. Cushing, Oil & Gas Producer, Sistersville, West Virginia.

Eugene Dailey, Administration Department, Wichita Natural Gas Company, Bartlesville, Oklahoma.

Harvey N. Dauler, President, Petroleum Products Company, Pittsburgh, Pennsylvania.

W. B. Davies, Foreman, United Gas Companies, Ltd., St. Catharines, Ontario, Canada.

T. O. Dial, The East Ohio Gas Company, Canton, Ohio.

C. W. DeForest, Electrical Engineer, Union Gas & Electric Company, Cincinnati, Ohio.

Dorr T. Denton, Division Superintendent, Iroquois Natural Gas Co., Buffalo, New York.

B. C. DeWitt, Lease Department, Southern Gas Company, Corpus Christi, Texas.

D. M. Dittman, Foreman, Iroquois Natural Gas Company, Hamburg, New York.

G. C. Donahue, Pressure Department, East Ohio Gas Company, Cleveland, Ohio.

F. T. Dooling, Machinist, East Ohio Gas Company, Cleveland, Ohio.

W. J. Doty, Leaser, South Shore Natural Gas & Fuel Company, Sheridan, New York.

Bernard F. Dowd, Mach., Peoples Nat. Gas, Buffalo, New York.

R. G. Dreher, Accountant, Dominion Natural Gas Co., Ltd., Buffalo, New York.

Carl K. Dresser, Sec'y. & Treas., S. R. Dresser Mfg. Co., Bradford, Pennsylvania.

George F. Drury, Oil Producer, J. W. Leonard Oil Company, Washington, Pennsylvania.

Mr. T. A. Dunn, Field Superintendent, Potter Gas Company, Port Allegany, Pennsylvania.

A. M. Ewing, Meter Department, Central States Gas Company, Vincennes, Indiana.

Fenwick Ewing, Leasing Department, Medina Gas & Fuel Company, Wooster, Ohio.

F. A. Fairchild, Agent, United Natural Gas Company, Meadville, Pennsylvania.

G. E. Falk, Cashier, South Shore Natural Gas & Fuel Company, Dunkirk, New York.

Peter Fay, Field Superintendent, Potter Gas Company, Smethport, Pennsylvania.

T. A. Fessler, Agent, Potter Gas Company, Elkland, Pennsylvania.

John Fisler, Foreman, Akron Natural Gas Company, Akron, New York.

Jas. T. Flanigan, Foreman, Iroquois Natural Gas Company, Buffalo, New York.

Geo. F. Fleming, Agent, United Natural Gas Company, Titusville, Pennsylvania.

R. B. Flint, Meter Inspector, Potter Gas Company, Port Allegany, Pennsylvania.

F. A. Fralic, Agent and Superintendent, Logan Natural Gas & Fuel, Galion, Ohio.

F. A. French, Potter Gas Company, Port Allegany, Pennsylvania.

Robert A. Frevert, Industrial Engineer, Dayton Gas Company, Dayton, Ohio.

W. S. Frey, Agent, Logan Natural Gas & Fuel Company, Bucyrus, Ohio.

E. K. Fuller, Agent, East Aurora, New York, Iroquois Natural Gas Company.

H. Fulsom, Foreman, Woodstock Gas Company, Woodstock, Ontario.

A. D. Fyfe, Geologist, Empire Fuel and Gas Company, Bartlesville, Oklahoma.

Glen N. Gale, Superintendent, Glenwood Station, Southern Ontario Gas Co., Ltd., R. R. 4, Merlin, Ontaria, Canada.

A. W. Gavin, Assistant City Superintendent, Iroquois Natural Gas Company, Buffalo, New York.

Jay Geist, Supt's Clerk, United Fuel Gas Company, Spencer, West Virginia.

B. M. Gessel, President, Anchor Oil Company, Tulsa, Oklahoma.

Oscar C. Gericke, Chemical Engineer, East Ohio Gas Company, Cleveland, Ohio.

Benjamin F. Goble, Foreman, United Natural Gas Company, Shinglehouse, Potter County, Pennsylvania.

Wallace B. Gribble, Special Representative, Hope Natural Gas Company, Clarksburg, West Virginia.

F. D. Grunder, Assistant General Sales Manager, Tube Department, Jones & Laughlin Steel Company, Pittsburgh, Pennsylvania.

H. E. Hall, Accountant, Dominion Natural Gas Co., Ltd., Buffalo, New York.

Henry C. Hall, General Bookkeeper, Iroquois Natural Gas Company, Buffalo, New York.

T. A. Hall, Engineer, Dominion Natural Gas Co., Ltd., Hamilton, Ontario, Canada.

M. E. Hammon, Foreman, South Shore Natural Gas & Fuel Company, Dunkirk, New York.

Robert S. Hampton, Secretary-Treasurer, Central Ky. Nat. Gas Co., Titusville, Pennsylvania.

T. L. Hanley, Superintendent, Hanley & Berd, Jackson Avenue, Bradford, Pennsylvania.

D. W. Hannon, Div. Foreman, East Ohio Gas Company, Canton, Ohio.

H. Harney, Jr., Inspector, Iroquois Natural Gas Company, Buffalo, New York.

W. H. Harrington, Superintendent, Citizens Gas & Electric Co., Elyria, Ohio.

Richard C. Hackstaff, Empire Pipe Line Company, Bartlesville, Oklahoma.

A. L. Hastings, Field Foreman, Oklahoma Natural Gas Company, Tulsa, Oklahoma.

C. M. Hawk, Chief Engineer, Logan Natural Gas & Fuel Company, Sugar Grove, Ohio.

Jas. C. Henning, Clerk, Manufacturers Su. Co., Kane, Pa.

A. W. Herring, General Manager, The Commercial Oil & Gas Co., Ashtabula, Ohio.

F. W. Herron, Secretary, Producers Gas Company, Olean, N. Y.

Geo. W. Hickernell, United Natural Gas Co., DuBois, Pa.

Ralph Hockstetter, Gunsberg-Forman Company, Buffalo, N. Y.

W. H. Hodge, Publicity Manager, H. M. Byllesby & Company, 208 South LaSalle St., Chicago, Illinois.

H. R. Hoffman, Acting Chief Clerk, Iroquois Natural Gas Co., Buffalo, New York.

H. T. Holland, Chief Engineer, Wheeler Compr. Sta., The Northwestern Ohio Natural Gas Company, Sugar Grove, Ohio.

F. M. Holliday, National Transit Company, Marwood, Pa.

W. M. Holly, Field Supt., Potter Gas Co., Shinglehouse, Pa.

J. N. Howard, Field Foreman, Medina Gas Co., Vienna, Ontario, Canada.

W. E. Howard, Foreman, Brantford Gas Co., Ltd., Brantford, Ontario, Canada.

W. E. Hunter, Vice President, Randall Gas Company, Morgantown, West Virginia.

Franklin R. Hurd, East Ohio Gas Company, Cleveland, Ohio.

R. W. Irwin, Agent, The Ohio Fuel Supply Co., Xenia, Ohio.

J. H. Isherwood, Gasoline Operator, Potter Gas Co., Shinglehouse, Pennsylvania.

H. L. Jacoby, Foreman, Producers Gas Co., Olean, New York.

C. W. Johnson, Asst. to Vice President, Hope Natural Gas Company, Pittsburgh, Pa.

Frank Johnson, Fieldman, Iroquois Natural Gas Co., Hamburg, New York.

Norwood Johnston, Superintendent, Carnegie Nat. Gas Co., Carnegie Bldg., Pittsburgh, Pa.

Paul R. Johnson, Gen. Manager, The Gas Pipe Line Corp., Independence, Kansas.

E. T. Jones, Division Foreman, E. O. G. Co., Cleveland, Ohio.

W. G. Kohl, Agent, Logan Nat. Gas & Fuel Co., Norwalk, Ohio.

E. B. Kellogg, Superintendent, Alden-Batavia Natural Gas Co., Batavia, New York.

A. N. Kerr, Gen. Supt., Riverside and Eastern Oil Cos., Pittsburgh, Pa.

Chas. Kiessel, Foreman, East Ohio Gas Co., Niles, Ohio.

L. C. Klein, Manager, West Park Office, Continental Supply Company, West Park, Ohio.

C. W. Kramer, Chief Engineer, Arkansas Natural Gas Company, Little Rock, Arkansas.

W. E. Larkham, Foreman, Calgary Gas Company, Calgary, Alberta, Canada.

James P. Laughlin, General Foreman, Street Department, The East Ohio Gas Co., Akron, Ohio.

Wm. G. Leamon, Chemist, Medina Gas & Fuel, Wooster, Ohio.

R. M. Leland, Asst. Supt. of Compressing Stations, Philadelphia Company, Pittsburgh, Penna.

J. W. Leonard, Oil Producer, J. W. Leonard Oil Company, Washington, Pennsylvania.

Frank O. LeRoy, Chief Clerk Chart Dept., Hope Natural Gas Co., Pittsburgh, Pennsylvania.

Frederick C. Leslie, Auditor, The Manufacturers Light & Heat Co., Pittsburgh, Pennsylvania.

Roy Lindsay, Foreman, Dominion Natural Gas Co., Ltd., Dunnville, Ontario, Canada.

Perry A. Little, Producer, Natural Gas & Oil, Buffalo, N. Y.

W. H. Lobaugh, Field Manager, Pavilion Nat. Gas Co., Pavilion, New York.

Guy H. Loveridge, Chief Clerk, Land Department, Iroquois Natural Gas Co., Buffalo, New York.

Paul Luebecker, Compressing Station Dept., Mfgr. Light & Heat, Wheeling, W. Va.

Carl H. Lutz, Civil Engineer, Dominion Nat. Gas Co., Buffalo, New York.

G. D. Lynch, Stock Man, Dominion Nat. Gas Co., Batavia, N. Y.

G. E. McCann, Shop and Garage Foreman, Iroquois Natural Gas Co., Buffalo, New York.

H. E. McCandless, Clinton Pipe Pulling Co., Cleveland, Ohio.

Harry M. McCandless, Agent, Clarion Gas Co., Clarion, Pa.

F. R. McCarthy, Superintendent, Oklahoma Nat. Gas Co., Tulsa, Oklahoma.

C. A. McClintock, Div. Foreman, East Ohio Gas Company, St. Clairsville, Ohio.

J. H. McCormick, Representative, H. Mueller Mfg. Company, Decatur, Ill.

L. M. McCormick, Foreman, East Ohio Gas Co., Warren, Ohio.

S. F. McCluney, Chief Production Dept., Oklahoma Natural Gas Co., Tulsa, Oklahoma.

C. O. McDowell, Supt., Kanawha Mfgrs. Gas Co., Charleston, West Virginia.

J. E. McGrimmon, Leaser, Dominion Natural Gas Co., Ltd., St. Thomas, Ontario, Canada.

M. A. McHenry, Lease Supt., Medina Gas & Fuel Co., Wooster, Ohio.

J. E. McKimmie, Purchasing Agent, Dominion Natural Gas Co., Ltd., Buffalo, New York.

C. B. McKinney, V. P. & G. M., North Texas Gas Co., Denison, Texas.

D. P. McMahon, Agent, Iroquois Natural Gas Co., Buffalo, N. Y.

Edwin Allan Macpherson, E. A. Macpherson Co., 301 Iroquois Bldg., Buffalo, N. Y.

John T. Mahoney, President, Commercial Oil Co., Buffalo, N. Y.

J. L. Maloney, Superintendent, Central Ohio Gas & Elec. Co., Wooster, Ohio.

W. C. Marckworth, Pres. Mountain State Gas Co., Charleston, West Virginia.

H. H. Marquis, Manager, Kane Supply Co., Kane, Pennsylvania.

W. J. Marriott, Foreman, Dominion Natural Gas Co., Ltd., Galt, Ontario, Canada.

Edgar J. Marston, Treasurer, Texas & Pacific Coal Co., 24 Broad St., New York City.

Martin Henry, Oil Producer, J. W. Leonard Oil Company, Washington, Pennsylvania.

D. F. Miller, Superintendent, Edgar M Moore & Co., Pittsburgh, Pennsylvania.

J. A. W. Miller, Assistant Superintendent, Pittsburgh Plate Glass Company, Ford City, Pennsylvania.

M. D. Montgomery, Foreman, Ingersoll Gas Light Co., Ltd., Ingersoll, Ontario, Canada.

Calvin T. Moore, Geologist, Henry L. Doherty & Co., Winchester, Ky.

M. J. Murray, Foreman, East Ohio Gas, Cleveland, Ohio.

C. J. Near, Foreman, The Union Natural Gas Co., Essex, Ont.

H. E. Nelson, Engineer, Manufacturers Gas Co., Erdice, Jefferson Co., Pennsylvania.

Henry B. Nickerson, Secretary, American Steam Gauge & Valve Mfg. Co., Boston, Mass.

F. H. Oliphant, Assistant Engineer, Iroquois Natural Gas Co., Buffalo, New York.

George L. Olney, Supt. Bldg. Construction, The East Ohio Gas Co., Cleveland, Ohio.

Jay C. Painter, Cashier, Oklahoma Natural Gas Co., Tulsa, Okla.

Adrian T. Parr, Safety Inspector, Henry L. Doherty & Co., Wooster, Ohio.

E. R. Perry, Cosden Oil & Gas Co., Tulsa, Oklahoma.

C. A. Pearson, Master Mechanic, United Natural Gas Company, Oil City, Pa.

D. H. Phillips, Agent, Potter Gas Co., Port Allegany, Pa.

A. A. Presho, Agent, Potter Gas Company, Westfield, Pa.

H. M. Prill, Cashier, Warren & Chautauqua Gas Co., Warren, Pa.

R. S. Pringle, Manager, Pringle Powder Co., Bradford, Pa.

E. C. Ramsey, Eng. in charge of field pressure, Ohio Fuel Supply Company, Columbus, Ohio.

Ira B. Reed, Assistant Secretary & Treasurer, Iroquois Natural Gas Company, Buffalo, New York.

J. M. Reiley, In Charge of Display Room, Iroquois Natural Gas Co., Buffalo, New York.

Chas. L. Reiser, Station Engineer, Iroquois Natural Gas Co., Collins Center, New York.

J. A. Remler, Superintendent Compressor Sta., Independence, Kansas.

J. A. Richie, Secretary-Treasurer, Dominion Natural Gas Co., Ltd., Buffalo, New York.

M. J. Roberts, Meter Tester, Beaver Oil & Gas Co., Ltd., Kingsville, Ontario, Canada.

W. A. Robertson, Field Man, Clear Creek Oil & Gas Co., Fort Smith, Arkansas.

H. P. Roby, Asst. Secretary-Treasurer, Inter State Pipe Co., Pittsburgh, Pa.

Raymond C. Rowan, Secretary to Vice President, The Union Gas & Electric Co., Cincinnati, Ohio.

Emil Rudert, Contractor, Saxonburg, Pennsylvania.

Albert Rush, Contractor, Manufacturers Light & Heat Co., Waynesburg, Pennsylvania.

C. H. Russell, Chief Sta. Engineer, United Natural Gas Company, Mt. Jewett, Pa.

R. C. Russum, Secy. & Treas., Quafaw Gas Co., Bartlesville, Oklahoma.

E. M. Ryan, Chief Gas Ledger Bookkeeper, Iroquois Natural Gas Co., Buffalo, New York.

J. L. Ryan, Agent, Iroquois Natural Gas Co., Salamanca, N. Y.

C. L. Saeger, Foreman, East Ohio Gas Company, Barberton, O.

R. N. Sargent, Works Manager, The Roseir & Hasslacher Chemical Co., St. Albans, West Virginia.

F. Sartorius, Treasurer, United Natural Gas Co., Oil City, Pa.

Jas. Scoville, Foreman, The East Ohio Gas Company, Akron, O.

George Scratch, Foreman, Beaver Oil & Gas Co., Ltd., Kingsville, Ontario, Canada.

Joseph Seep, President, Central Ky. Nat. Gas Co., Oil City, Pa.

F. Shafer, Superintendent, Southern California Gas Company, Los Angeles, California.

Jay R. Shattuck, Chief Clerk, Chart Dept., Iroquois Natural Gas Company, Buffalo, New York.

A. B. Shenker, Moving Contractor, Shenker & Shenker, West Park, Ohio.

C. L. Short, Superintendent, Boone Territory, Mountain State Gas Co., Peytona, West Virginia.

Chas. W. Slach, Superintendent, The Attica Natural Gas Company, Attica, New York.

Butch Slagle, Oil and Gas Producer, Continental Supply Company, West Park, Ohio.

Ed. Shriver, Foreman, East Ohio Gas Company, Ravenna, Ohio.

C. M. Sloan, Clerk, Shop, Iroquois Natural Gas Co., Buffalo, New York.

C. T. Sloan, Assistant Engineer, Iroquois Natural Gas Company, Orchard Park, New York.

W. L. Sloan, Foreman Station Men, Iroquois Natural Gas Co., Buffalo, New York.

Frank D. Smith, Agent, Springville, Iroquois Natural Gas Co., Springville, New York.

C. B. Snider, Superintendent, Cahokia Gas & Oil Co., Edwardsville, Illinois.

E. F. Southwick, Credit Clerk, East Ohio Gas Company, Cleveland, Ohio.

C. H. Spencer, Shop Superintendent, Calgary Gas Company, Limited, Calgary, Alberta, Canada.

G. M. Stafford, Foreman, Pennsylvania Gas Co., Corry, Pa.

G. A. Stearns, Sawyer-Stearns-Streeter Drilling Corporation, Buffalo, New York.

F. W. Steere, President, Steere Engineering Co., Detroit, Mich.

E. M. Stephanus, Salesman, Broderick & Bascom Rope Co., St. Louis, Mo.

Lloyd Stroup, Field Foreman, Dominion Gas Co., Marlin, Ontario, Canada.

John Stroup, Foreman, Glenwood Natural Gas Co., Ltd., Port Alma, Ontario, Canada.

Joseph E. Swendeman, Special Representative, Am. Steam Gauge & Valve Mfg. Co., Boston, Mass.

George Taylor, Foreman, Alden-Batavia Natural Gas Co., Batavia, New York.

George E. Taylor, Assistant Engineer, Public Service Commission of West Virginia, Charleston, W. Va.

Victor S. Teegustram, Plumbing, Kane, Pennsylvania.

L. J. Texter, Foreman, Pairlion. New York.

W. P. Thompson, 53 Kennedy St., Bradford, Pennsylvania.

R. John Titzel, Gas Engineer, United Gas Electric Engineering Corporation, Birmingham, Alabama.

John Tonkin, Vice-Prest. & Gen. Manager, Central Kentucky Nat. Gas Company, Oil City, Pa.

T. J. Tonkin, Jr., Superintendent, Frankfort, Ky. Nat. Gas Co., Frankfort, Kentucky.

A. A. Topp, Foreman, Central Repair Shop, The Ohio Fuel Supply Company, Mt. Vernon, Ohio.

E. E. Torrance, Foreman, Frost Gas Co., Fredonia, New York.

Calvert C. Tucker, Engineer, Dominion Natural Gas Co., Buffalo, New York.

Davis H. Tucker, Engineer, Southern Ontario Gas Co., Ltd., Merlin, Ontario, Canada.

Arthur Tyng, Consulting Engineer, Iroquois Natural Gas Co., Buffalo, New York.

J. F. Vallely, Agent, Iroquois Natural Gas Co., Cattaraugus, New York.

Harry P. Watts, Field Clerk, Peoples Natural Gas Company, Brave, Greene County, Pennsylvania.

Henry P. Wege, Oil Well, Refinery & Mill Supplies, Oil City, Pennsylvania.

A. Miner Wellman, President, Tri-County Natural Gas Co., Caledonia, New York.

J. H. Wiggins, Engineer, Indian Ty. Ill. Oil & Gas Co., Bartlesville, Oklahoma.

D. W. Williams, Geologist, Dominion Natural Gas Co., Ltd., Buffalo, New York.

W. A. Williams, Superintendent, Eastern Oil Co., Weston, West Virginia.

J. A. Willsey, Asst. Superintendent, Ashtabula Gas Co., Ashtabula, Ohio.

W. E. Wilson, Agent, Pennsylvania Gas Co., Corry, Pa.

F. D. Witkorski, Chief Inspector, Union Nat. Gas Co. of Canada, Ltd., Chatham, Ontario.

L. S. Wood, Foreman, Pennsylvania Gas Co., Warren, Pa.

PRESIDENT GUFFEY: We will now hear the Reports of the Secretary and Treasurer, the first being the regular report of the receipt and disbursement of the funds received from dues of members and so forth, and then the Report of the Voluntary Contributions we have had during the past year for the maintenance of permanent headquarters.

Mr. T. C. Jones then submitted the following:

REPORT OF THE SECRETARY AND TREASURER.

To the Natural Gas Association of America:

GENTLEMEN: I have the honor to present the Annual Report to the Secretary and Treasurer, for the year ending May 1, 1917.

MEMBERSHIP REPORT.

Honorary Members—	
As per Membership Rolls, May 16, 1916	8
Active Members—	
As per Membership Rolls, May 1, 1916	879
Elected May 16, 1916	399
Total	1,278
Released from Membership, May 16, 1916	104
Died during the year	6
Total	110
Total	1,168
Total Membership this date	1,176

FINANCIAL REPORT.

RECEIPTS.

Balance, May 1, 1916	$3,227 14
Dues	4,595 00
Initiation Fees	1,990 00
Books of Proceedings, sold	20 00
Total	$9,832 14

EXPENDITURES.

Printing and Stationery	$2,540 37
Stenographic Report, Eleventh Annual Meeting	178 41
Clerical Assistance	59 75
Salary, Secretary-Treasurer	1,000 00
Wrinkle Department, Prizes	100 00
Badges and Convention Hall Equipment	211 00
Postage, Express and General Expenses	658 53
Balance on Hand, Delaware Savings Bank	5,084 08
Total	$9,832 14

STATEMENT OF OUTSTANDING ACCOUNTS.

42 Members Three Yers' Dues, @ $15.00	$630 00
59 Members Two Years' Dues, @ $10.00	590 00
353 Members One Year's Dues, @ $5.00	1,765 00
Total	$2,985 00

Respectfully submitted,

T. C. JONES,

Secretary-Treasurer.

Mr. T. C. Jones then submitted the following:

REPORT OF THE TREASURER, SPECIAL FUND NO. 2.

To the Directors of The Natural Gass Association of America:

GENTLEMEN: I have the honor to present the report of the Treasurer's Special Fund, for the maintenance of the Association's Pittsburgh Office from, July 27th, 1916, to May 1st, 1917.

Receipts	$15,090 53
Expenditures	8,808 47
Balance on Hand	$6,282 06

Respectfully submitted,

T. C. JONES,

Treasurer.

PRESIDENT GUFFEY: You have heard the Reports of the Secretary and Treasurer, gentlemen, which indicate at the present time that our Association is in pretty good condition, so far as finances are concerned. What is the wish of the meeting? I

believe the usual course of business is to order the reports accepted, placed on file and spread upon the minutes.

MR. J. M. GARARD: Mr. President, I move that the reports, as read by Secretary Jones, be accepted, placed on file and ordered spread upon the minutes.

MR. PAUL LUEBECKER: I second the motion.

And thereupon the above motion having been duly seconded and carried, said reports were accepted, ordered placed on file and spread upon the minutes.

PRESIDENT GUFFEY: The next report is the report of the Auditing Committee, of which Mr. Reeser is Chairman. I will call upon Mr. Reeser for his report.

Mr. H. C. Reeser then presented the following:

REPORT OF THE AUDITING COMMITTEE.

BUFFALO, N. Y., May 15, 1917.

To The Natural Gas Association of America:

"GENTLEMEN: Your Auditing Committee has checked the cash balance of May 1st, 1916 and receipts and disbursements for this year as shown by the statement and bank book, and find that they correspond. The Special Fund account has also been checked to May 1st, 1917, and we find the report to be correct.

We respectfully suggest, however, that the system of accounting be changed so that a proper audit can be made of the receipts and delinquent accounts, as from the books submitted it can not be done, and also that all bills be approved by the President, Vice President or a committee authorized by the Association, as under the present system no bills are approved.

The indemnity bond of the Secretary-Treasurer has been examined and found correct. It expires on June 14th, 1917, and is for $3,000.00. In view of the larger volume of business now transacted, we would respectfully recommend that the bond be increased accordingly.

H. C. REESER,
J. B. TONKIN,
L. A. SEYFFERT,
Committee.

President Guffey: Gentlemen, you have heard the report of the Auditing Committee. What is your pleasure?

It was then moved by Mr. J. W. McMahon, and duly seconded by Mr. J. M. Garard that the Report of the Auditing Committee be received, placed on file and ordered spread upon the minutes.

President Guffey: Mr. Braden will you kindly preside for a few moments?

Mr. Glenn T. Braden, Vice-President, then assumed the President's chair and said:

Gentlemen, I will now call on the President for his Address.

Mr. Joseph F. Guffey then delivered the following:

PRESIDENT'S ADDRESS.

JOSEPH F. GUFFEY.

To the Members of the Natural Gas Association of America:

We are assembled today in our Twelfth Annual Convention to review the work of the year just completed, and, taking courage and inspiration from our past achievements, to plan as hopefully and wisely as may be for the future.

As I read over the addresses of many of my predecessors in this office, it gave me pleasure to find that most of the hopes and few of the fears therein expressed have been realized.

The past year has brought to us a fair measure of prosperity, though we were called upon to meet the greatest demand in our history and under the most adverse conditions.

We are entering upon a condition in the affairs of our nation more critical than has ever confronted any of those here present; and it behooves us to give careful and sane consideration to all our business problems. For years, the chief thought of every successful gas man has been along the lines of conservation; but until now, no concerted national effort has been made by which all the resources of this great country of ours will be brought to the highest point of efficiency. Not only national honor, but our individual welfare, is at stake and every man must work to see that his efforts bring forth the greatest

results. Conservation must be more than a word. It must be a fact and, in order to bring about this greatly to be desired result, each and every member of the Association should put forth his every endeavor as an individual and as an executive to see that every possible form of waste is eliminated.

We may be called upon by the Government to make sacrifices involving pecuniary losses and personal discomforts. One of our members now is actively engaged on the National Defense Board in work which will be of great benefit to our Government in the all important work of furnishing petroleum, lubricants and gasoline.

We have offered the co-operation of our Association along any lines which would be of assistance to the Government in the way of increasing production, especially in the recovery of gasoline. I sincerely trust that you will not only give your hearty support to this action as an organization, but that each member will personally take up the offer and give it his individual endorsement.

At the 1916 meeting of this Association, held in Pittsburg, the Ways and Means Committee recommended that permanent headquarters be established, to be devoted solely to the best interests of the natural gas industry; and, further, that the Ways and Means Committee be authorized to equitably classify and assess the various companies identified with the Association to the end that necessary funds be provided, and that the incoming President be empowered to appoint a Resident Secretary. This recommendation was unanimously adopted, and by virtue of the authority contained therein, permanent headquarters were established in rooms 904 and 905, of the Henry W. Oliver Building, Pittsburgh, Pa., and Mr. David O. Holbrook was placed in charge of the same as Resident Secretary. As yet, the Ways and Means Committee has not made a final recommendation as to the manner of raising the necessary funds to carry this plan into effect, but your Association is indebted to the following companies for their very generous financial support during the year, they having in the aggregate voluntarily contributed $15,000.00:

Union Natural Gas Corporation,
Natural Gas Company of West Virginia,
Philadelphia Company,
American Natural Gas Company,
Carnegie Natural Gas Company,
Manufacturers Light & Heat Company,
Ohio Fuel Supply Company,
Fayette County Gas Company,
East Ohio Gas Company,
Peoples Natural Gas Company,
Hope Natural Gas Company,
Connecting Gas Company,
Reserve Gas Company,
Greensboro Gas Company,
Henry L. Doherty & Company,
Dawes Interests,
Columbia Gas and Electric Company,
United Fuel Gas Company,
Osage & Oklahoma Gas Company
Lone Star Gas Company,
National Fuel Gas Company.

This permanent office exists solely, as was recommended, for the advancement of the interests of the natural gas industry. With its resources, we are endeavoring to collect and make instantly available, to the members of the association and contributing companies, an invaluable fund of statistics and information concerning all phases of the natural gas industry, including decisions rendered by public service commissions and the courts. Many of you have already taken advantage of your privilege to call upon the Resident Secretary for assistance in gathering facts in regard to rates, public service decisions, rules governing deposits, readiness to serve charges, and many other questions which I might mention.

Such an undertaking requires the hearty co-operation of every member of the Association, as the office is in reality a clearing house for information valuable alike to the members of our organization and the companies they represent. I trust

you will bear in mind that it is only by using this office and asking for information that it can be brought to its greatest efficiency.

If we are to continue our permanent headquarters and carry out the plans of organization as now outlined, we should have an annual income of at least $25,000.00, and we hope the Ways and Means Committee are prepared to submit some practical plan whereby this sum will be assured.

During the past year, your Association has been able to render service in connection with proposed adverse legislation, both National and State. At the present time, no extreme or radical legislation is under consideration affecting the natural gas industry, as far as your officers are aware.

These are days when, by reason of the democratization of government, the business interest here, like the landed aristocracy on the other side, are tending to a fair division of profits. Education, now not only free but compulsory, is the great leveling process of democracy, and it is because of this fact that efficiency has become the watchword in the natural gas business as well as in all other lines of endeavor. We must be efficient or give way to others who are. The members of this Association are connected with companies which are primarily public service corporations. The chief end of such companies is not to return big earnings to their owners, but to render service to the people; and all questions which affect the production, transportation and marketing of natural gas must be decided with this one consideration uppermost: How can our service to the public be maintained and improved?

Our Association is to be congratulated upon the fact that, with very few exceptions, the men appointed as members of the Public Service Commissions of the various states have been high class, broad minded citizens; and that the disposition of the Commissions has been first to ascertain the facts and then to do equity between the parties. While many questions are still unsettled, a good beginning has been made.

As has already been stated, this Association has for one of its most important functions the assisting of its members by the tabulation of statistics and presentation of facts for use

before Public Service Commissions. The service feature, of which I have spoken, is sometimes lost sight of in rate cases before these authorities. It is an important consideration. The interest of the public in paying adequate rates is greater than that of the company in collecting them. A crippled company means crippled service. To be successful in the natural gas business, a company must have sufficient financial strength to enable it to make not only extensive explorations, but also extensions to its transportation system. Consumers will gladly pay much higher rates than those which now prevail if they can thereby prevent a natural gas shortage. A gas company's securities should be a safe and conservative investment. Such companies should not be allowed by Public Service Commissions to supply the public with gas at rates which are too low to produce earnings sufficient for the amortization of their capital, a fair dividend returned on their investment, and additional earnings to justify them for the extra hazard of the business. Public Service Commissions should stabilize the securities of public utilities.

We are deeply indebted and correspondingly grateful to the gentlemen who have so generously given their time and thought to the preparation of the papers to be presented to you during this Convention. We can easily applaud their reports; but we can show our appreciation of their work in no better way than by hearty participation in the discussions to follow, thus deriving the full benefit of their papers.

I wish it distinctly understood that all statements contained in this brief address represent my personal views, alone and not the opinion of the Association. In this connection, I am going to suggest that the Association itself at this meeting, in so far as it may be practicable, determine the scope desired for future work.

To have served this Association as its President is an honor and a privilege, by me highly appreciated. My year is at its close. It has been a year full of activity and full of promise. For the many courtesies and the cordial co-operation which I have received at the hands of the Officers and Members of the Association, I am deeply grateful, and, for the new acquaintances and warm friendships made, I am the richer.

In conclusion, let me assure you that when I turn over to my successor the gavel of authority, I shall do so, feeling, not only that this Association, by valuable services rendered, has earned the right to our earnest support, but also that it can and will, by its increasing helpfulness, be made an indispensible assistant to all men who follow the varying fortunes and fascinating uncertainties of the natural gas industry.

A hearty round of applause followed the reading of the above President's Address, after which Vice President Braden said:

Gentlemen, you have heard the President's Address. What action do you wish to take?

MR. MARTIN B. DALY: Mr. Chairman: I am sure that every member has enjoyed the intelligent and instructive address of our worthy President and I know we all appreciate the energy and skill he has devoted to its preparation. No man is more able to give us instruction along the line he has spoken about. I move that the President's Address be referred to a Committee of three to be appointed by Vice President Braden, this Committee to report later as to what recommendations it may have to offer with reference thereto.

MR. PAUL LUEBECKER: I second the motion.

The above motion having been duly seconded was carried and Vice President Braden then appointed the following:

COMMITTEE ON PRESIDENT'S ADDRESS.

Martin B. Daly, of Cleveland, Ohio;
J. W. McMahon, of Toledo, Ohio;
O. K. Shannon, of Fort Worth, Texas.

President Guffey then resumed the chair of the presiding officer, and said:

Gentlemen, the first paper to be presented at this session is one by Mr. John W. Lansley, Secretary South Western Gas & Electric Company, Chicago, Illinois, on the subject "The Effect of Publicity on Business Relations." I take great pleasure in presenting to you Mr. Lansley.

Mr. John W. Lansley then read the following paper:

THE EFFECT OF PUBLICITY ON BUSINESS RELATIONS.

By John W. Lansley

The best evidence that "Publicity" has made good in public utility service is found in the fact that it has become firmly established as an important subject for discussion at conventions of this character. Recognition of the power of publicity has come more slowly in the natural gas business than in some others, but it is here at last. There are few among us who still doubt the efficacy of judicious, truthful and well prepared advertising.

For a long time we clung tenaciously to the error that low prices would do all the talking necessary to sell gas and hold the business in its rightful place in public esteem. With some surprise, we recently awoke to the discovery that the public does not always recognize a low price when it sees it, that people must be told things before they can be expected to believe them,

that they must know before they can have confidence, and that business relations without confidence are certain to be unsatisfactory if not unprofitable.

Assuming that the primary general object of publicity in the natural gas business is to inspire confidence in the public mind, we have full economic justification for advertising expense within reasonable bounds. The kind of business relations existing between natural gas companies and their customers measure the commercial value of the publicity department's work and the dimensions of the task to be performed.

The natural gas company engaged in selling gas to the public is, first of all, amendable to state regulation as to its rates, character of service, and often its financing operations. This regulation is the outgrowth of public opinion. To whatever extent it is just and fair or unjust and unfair, to exactly that same extent the business has acquired or neglected to acquire the confidence of the public, its customers.

Regulatory laws are often fairly and justly interpreted by Courts and Commissions, but inspection of the literal provisions of many of these laws points clearly to lack of confidence on the part of the public. Lack of public confidence results from lack of public knowledge, and lack of public knowledge is due to improper or neglected publicity.

Attacks are made indiscriminately upon rates that are just and reasonable. Low prices are no more immune against challenge than high prices. These attacks come out of public ignorance of the cost, hazard and difficulty of producing, transporting and distributing gas. The persons who institute them, being themselves ignorant of the business, as a rule, are merely the instruments or self-appointed champions of the popular will.

Complaint of the character of service, usually the result of the company's inability to meet an overwhelming demand in winter, is the natural expression of people undergoing discomfort without fully understanding the conditions with which the companies are beset.

Interference with necessary financing is the consequence of a mistaken notion that a capital stock or bond issue is a basic

element in determining what is a fair and reasonable price for the service rendered.

These three classifications embody practically all the troubles that come under the head of Public Relations. If such troubles are due to lack of knowledge on the part of the public, it follows that they can be minimized or reduced by proper publicity.

The question of what is proper publicity for any particular company, or for the business at large, is purely speculative, except as experience may have disclosed the effects of certain efforts in specific instances. It is a problem that would have been worthy of the wisest consideration of a well advertised ancient ruler of renown. Solomon of old was not noted for keeping his affairs to himself, and yet a great many people have been led to believe that he knew his business.

How to go about the work of publicity designed to inspire confidence and improve the business relations existing between natural gas companies and their millions of patrons is of great and ever-growing importance to producing, transporting and distributing companies alike. It is a comparatively new and still somewhat strange field of labor for the financier, the miner, the engineer and the public utility expert. Experience costs money, and mistakes may be serious, if not fatal. The oldest hand tackles the job with least assurance. Every situation demands a different formula or a new plan, yet the continuous effect of all good publicity must be consistent and unvarying.

Any deviation from the exact truth in advertising or canvassing, any error in the logic or argument, any "break" that indicates ignorance of the business, is fatal or injurious to the effort. It is necessary, therefore, to place this work in the hands of those who have the faculty of understanding human nature and the wisdom to be patient with it, who are familiar with the business and competent to judge how much or how little should be said on any subject to give it proper relative importance, who have had sufficient experience and training to enable them to write clearly and expressively. Literary frills will not be needed. It is the plain statement of fact and simple argument that carry most weight and are most likely to inspire confidence in the mind of the reader.

There are various vehicles for publicity, but experience has taught many of us that the daily newspaper is the best and most economical of all in view of the result to be obtained. Practically all the large public service corporations, from the railroads down, are now using advertising space in the daily papers freely to present their aims and claims to the public.

That an increasing number of companies are pursuing this method to gain and hold public confidence, and that the amount of expenditures for this purpose is apparently growing, indicates that the effect of such publicity is worth the time and money spent upon it.

Any fixed policy of publicity, such as determines the character and cost of the work to be done, must be decided upon in advance according to the conditions that exist in the locality to be covered. Attempting to lay down permanent rules for advertising would only invite failure. To try to prepare advertising to fit different cities served by different companies under different conditions would be as futile as for a lawyer to make the same plea to every jury in every case.

If we believe that the effect of publicity is to improve our business relations with our customers, upon whom we depend for our revenues and who dictate the laws under which we must operate, then the proposition is important enough to merit our best attention in each particular case. No doubt, everyone present who has had experience with publicity in the public utility business could relate instances of beneficial results, but such instances are valuable chiefly as testimony in favor of the general policy and can seldom be used to the best advantage in other situations.

The writer has had some experience in preparing publicity matter to meet or anticipate conditions arousing or likely to arouse public complaint. In every case the daily newspaper has been sufficient as a medium through which to reach the ear of the public. In every case it has been found advisable to discard the exact forms of previous undertakings, make a new diagnosis and write a different prescription; as in medicine, much depends upon a true diagnosis. In every case the public has been found willing and anxious to hear the company's argument, though it

might be directly contrary to the public opinion previously held. In every case it has been possible to make a truthful, candid, convincing statement of the company's side without exposing any mysterious inner secrets of the business. In every case of publicity designed to improve our business relations, we have found the expenditure profitable, I make bold to assert, though this latter statement is but the opinion of one who may justly be termed a prejudiced witness.

It is easy to write interesting stories of fact about the natural gas business. There is no more romantic industry than the production of this God-given fuel from the depths of the earth. Then why not tell the public, tell them repeatedly until they are taught, about the drilling and maintenance of gas wells in the fields from which their supply is drawn? Do you suppose any gas consumer ever gives thought to the millions of dollars fruitlessly invested in dry holes and lease rentals throughout the world, or realizes that these fruitless endeavors measure the hazard of the producing business and are truly a part of the actual investment involved in natural gas service? If no one gives the natural gas business credit for this investment — and you are hereby advised that no one does — whose fault is it?

Among the greatest and most modern transportation agencies in the world are the pipe lines which carry natural gas from the wells to the cities served, sometimes many hundreds of miles distant. Then why not speak of the gigantic problems met in financing, constructing and maintaining such enterprises? How many gas consumers know that the size of a pipe line is limited by their own ability to pay, in the price of gas, a fair return upon the investment? How many know that compressors are necessary to transport gas and are not designed to pump air through the meters? As an amateur student of public opinion, the writer respectfully represents that public ignorance on these points and scores of others is abundant.

The business of distributing natural gas to the people of those communities fortunate enough to be within the zone of its economical delivery is an exacting and complicated service. The margin of profit per cubic foot upon which the distributing

company must operate is usually very small. It is only through heroic effort and extreme skill and efficiency that the average distributing company can earn a fair return. Then why not take our customers into our confidence and let them know what they are getting and how they are getting it?

That the public generally believes that natural gas has less heating power than artificial gas, that it believes that large consumers are favored at the expense of small consumers, that it often believes the company adulterates the gas, "fixes" the meters, falsifies the bills — all this error and much more of a similar nature is an indictment against us for neglecting to look after our business relations in a proper manner.

Blaming the public for being suspicious of those things about which it knows nothing is condemning good business sense. The consuming public is neither less honest nor more honest than the producing public. If popular opinion is unfair to natural gas companies, if municipal restrictions are unfair, if state regulatory laws are unfair, then all this unfairness must be due to lack of information, which is only another way of saying lack of publicity. If the effect of publicity is to induce fairness in trade between individuals, it is a vital element in business life, its cost a legitimate and necessary operating expense, its neglect an evidence of poor management.

Discussion of the minor details of publicity intended to improve the business relations of gas companies and the public and to promote confidence and harmony, would not lead us anywhere in a gathering such as this. It is doubtful whether such a discussion would accomplish anything in a convention composed entirely of advertising experts. The mediums most available, the amount of money to be appropriated for the purpose, when and how to prepare copy for advertisements, the space and type to be used — all must be decided for each company according to the conditions with which it is confronted, and then left to the skill and judgment of the man who is given charge of the work.

As there can be no set rules or formulas in publicity, any specified number of men may be depended upon to hold an

equal number of opinions regarding the details. The leading experts in the advertising world disagree radically upon the minor points of their profession. It is useless to follow fixed forms in publicity, as it would be in personal correspondence, and good publicity work cannot be done beyond sight, hearing and touch of the local consciousness to be reached.

In important matters of finance, engineering and construction, we trust the work to the man in charge and hold him responsible. It should be so with publicity. The company's task, as in the selection of a superintendent, attorney or head of department, is to put the right man in charge. While we cannot make much progress in considering details of publicity, we can, however, give attention to certain general conditions, with a view to consistent effort to combat, correct and improve them. In this way, the continuous publicity work of local companies in their respective fields of service will be uniform, logical and cumulative in its effect, the final successful result being a changed universal opinion of the natural gas business as a whole. From this changed opinion the industry will have gained permanently a reasonable degree of public confidence, which is all we ask in our contests with Nature and our controversies with those we serve.

Every natural gas company is aware of the extraordinary heat energy of its product, as compared with other fuels, its hygienic value, its non-poisonous characteristics and other virtues of practical application. Under this heading alone may be found subjects for scores of interesting, instructive and effective advertisements, each of them capable of adding to the sum of public knowledge and strengthening public confidence in the merit of the gas itself.

To some of you the serious constant reiteration of such self-evident facts may appear unnecessary and useless, but the masses of the public are no more familiar with these things than is the uneducated child familiar with the fact that two and two are four until it has been permanently hammered into him. It is the very simplicity of the things we desire the public to know that makes the greatness of our opportunity.

Of late, the light has been breaking in on the industry in the matter of prices at which natural gas is sold. Possibly, we are not, as yet, all of one mind on this subject, but facts cannot remain hidden forever, and some day, if not right now, we must admit that the selling price of natural gas always has been far below its true economic value in comparison with other fuels, that the companies have sacrificed millions of dollars in this way, for which the public has not always given even good will in return, and that in consequence of these low prices wasteful use and earlier exhaustion of supply are inevitable. Many formerly productive natural gas fields, now only memories of glorious fuel saturnalias of the past, might still be engaged in the public service but for the uneconomic low prices at which the gas was sold.

If the industry itself is just coming to the point in its development where these facts are recognized and admitted, it is not strange that the consuming public exhibits no zeal in helping us establish higher and more equitable rates.

Cut-throat competition and piratical enterprise in the early days of natural gas production laid upon the industry a handicap of absurdly low prices from which it has not yet emerged. Flamboyant promoters, preaching of inexhaustible supply and uncountable profits, convinced the public that any price that might be charged for natural gas was too high. They have rested from their labors, but tormenting evidences of their activity remain. The publicity man will have to do most of the heavy shoveling in clearing away the rubbish still left in the public mind.

The true value of natural gas fuel, compared with the price; economic methods of use, compared with wasteful methods; the duty of the industry and the public to conserve, as far as possible, the known supply — all offer many fruitful topics for treatment in the public prints. The right price for gas is always a live subject and will get the attention of the public whenever it is mentioned. The natural gas industry sells a fuel richer in heating value at a price much lower than is usually charged for artificial gas, but the natural gas is not freed from

complaint by reason thereof, and will not be, until full publicity on the point of price has been given.

This industry, in the same manner as other public utilities, is harassed and impeded because of the mistaken popular idea that small consumers are over-charged in favor of large consumers. Politicians make much of this idea and it enters, in some form, into all questions of rate regulation. It is responsible for much ill feeling among consumers of gas and makes development work and satisfactory service more difficult. It is a part of the error which must be removed by publicity before our business relations with our customers can be on a fair co-operative basis.

There are many things to be said in an interesting way on this subject through carefully prepared advertising. The records of all natural gas companies are now kept in such detail that analysis of consumers' accounts is easily made. It will be found, without exception, that large numbers of small consumers receive service at less than cost and that larger consumers must make up this deficit and the return on the investment. It is necessary that this fact be firmly impressed upon the public before equitable schedules of rates can become popular.

The statement that the small consumer is a losing proposition for a public utility company is generally received with incredulity in any community, which is evidence of the widespread ignorance on this point and the need of persistent publicity. There is no reason to fear the publication of facts relating to this subject, when diplomatically presented. Popular knowledge as to the relative commercial status of small and large consumers will bring about much better relations between the public and the company, and is a sound basis on which to strive for more equitable or higher rates. Public opinion is pretty decent when it feels the big fellow is getting the worst of it.

In times of shortage due to extremely cold weather or excessive demand from any cause, complaint of natural gas service is universal. Nothing so intensifies the feeling of antagonism toward a public service corporation as physical discomfort,

and the relations between the company and its customers are seriously affected on such occasions. As we are well aware, combinations of circumstances sufficient to cause interrupted or impaired service will arise at intervals as long as natural gas exists. The best method of anticipating and meeting such situations is, therefore, clear. It is better to advise the public, through proper publicity, of the numerous forces that constantly put their service in peril than to induce or allow them to believe the supply of gas is more than sufficient for every emergency and inexhaustible.

The little added business that may be gained by over-assurance is no recompense for an angry community with frosted toes, believing they have been deceived or that the company is incompetent. The benefits of natural gas service are so great during the major portion of the year that they completely overshadow the discomfort of a few days of interrupted service or the small expense of providing auxiliary equipment and fuel.

A natural gas company should not hesitate to make this plain to all who use its service, and when it has done so it will find a great difference in the temper of its patrons. The simple fact that the supply of gas at the wells and the capacity of any pipe line are subject to the laws of Nature, while the possible demand for service is unlimited by any law, should be impressed upon every user of natural gas.

When this is done, the complaint following interrupted service will not only be less serious, but personal discomfort and business disorganization will be greatly diminished. Publicity is the answer here, as everywhere in matters which affect the business relations between the company and the people.

"Excessive profits" is a delicious phrase for the demagogue who mouths of millions in his attacks upon public service corporations, and the bigness of the sums involved helps to carry conviction to the public mind. Anything to which the word million may be applied has few elements of popularity in this country of free speech and democratic ideals. Reduced to smaller units, of equal truth and importance, the large figures

of investment and income become more intelligible and less offensive.

It is often advisable and necessary to speak publicly of the financial affairs of a natural gas company. In such publicity, it is well to present a few facts as to the size and extent of the property in use whenever the amount of the investment in dollars is mentioned. Gross income and earnings appear much less excessive to the public when the number of consumers is known and the small sum which each individual contributes is calculated.

Unjust taxation becomes unpopular and indefensible when treated as a certain excess tax levied upon gas consumers for the support of the general public. Free service work, to which many companies devote attention for the purpose of improving business relations, does not produce the full results of which it is capable unless it is supported by proper publicity.

It is impossible to enumerate here the many ways in which plain facts concerning the natural gas business can be presented to the public with beneficial effect, but experience tends to show that all truthful, candid, seriously undertaken publicity is good, that it improves the relations existing between company and consumer, whether such relations may previously have been satisfactory or otherwise. In doing so, it assists commercial development, makes larger sales possible and aids the company in procuring reasonable prices for its product.

The term "Publicity," as applied to the natural gas business, is generally understood to mean the various forms of printed matter, newspapers, periodicals, booklets, circulars, etc., which it has been customary to make use of in advertising. In that aspect, the subject has been treated here, but there are other forms of effective publicity which should not be overlooked. Good service, polite demeanor on the part of officers and employes, and making apparent by word and action the company's desire to treat the public fairly and give the most value possible for the money, will be found to help materially in establishing and maintaining the cordial relations we seek. Energetic and sincere participation in the general activities of community life

is of great assistance to the manager of a distributing company. It identifies him publicly as a live one, interested in the affairs of the people, as well as his own, and goes far toward fixing the status of the company as a real and valuable citizen, ready to pull its share in the tug of war for common advancement.

Managers, heads of departments and employes of all grades may discreetly take active part in the business and social life of their cities. Membership in commercial associations, clubs and societies offers many opportunities to the public utility man for broadening and extending his usefulness and influence, provided it is not pushed to such excess as to arouse the enmity and ill will of other leading citizens ambitious in fraternal and social circles. The personal ambition of a good gas manager is circumscribed by the gas business. As a career, it has no superior in variety and intellectual exercise.

We have spoken of the necessity of local plans and policies in publicity because of the differences in conditions with which distributing companies are surrounded. Such handling of publicity undertakings is most effective, but it is possible to compile much general information relating to the industry at large and place it at the disposal of all companies for use in publicity campaigns.

Statistics covering the extent and difficulties of natural gas production, transportation and distribution throughout the country will be read with interest by the consuming public and furnish safe topics for publicity under all circumstances.

An expert detailed survey of the industry that would show its possibilities of service from the known fields of production, the possibilities of transportation under peak load demand, and the possibilities of commercial development under proper and reasonable schedules of prices would be very helpful in guiding general publicity along lines of logical argument and practical accomplishment. Information of this nature could be so intelligently and persistently used that it would eventually give the entire gas-consuming public a truer idea of the real worth of natural gas to mankind. It would also develop a keener sense

of fairness to and confidence in the men who have discovered, harnessed, driven and delivered it to the homes and factories of the people. Incidentally, many of us would probably be instructed and made more efficient as a result of our labors.

The aim of publicity being to give correct information to the public, the foundation for it must be possession within the industry of correct information touching every point that has a bearing upon the character of the business relations it is desired to sustain. We have entered upon a period in public utility service that concedes the profitableness and necessity of co-operation between producer and consumer. Both must derive benefit from every legitimate transaction. Co-operation is impossible without mutual understanding, and mutual understanding can only come by transference of knowledge within the industry to those on the outside. The agency is, of course, publicity.

It is the duty of managers of gas companies to inform themselves upon every phase of popular misconception of the business. Their accountants, their engineers, their new-business chiefs can give them the facts, and their publicity department will know, or should know, how and when to make use of them.

Publicity work cannot be done effectively in a half-hearted or insincere manner. The determination to make things right must exist before it can be demonstrated. A true story must be told many times before everyone will know it.

Reputation is built upon publicity and varies as the publicity is good or bad. Publicity obtained without effort or expense is generally bad. If the natural gas business is to occupy its proper place in public regard, it must prepare and pay for its own publicity. Disgruntled consumers and shyster politicians constitute a poor advertising force for a gas company. Truthful publicity intercepts the existence of the one and neutralizes the other.

Our business relations with each other are founded upon such knowledge as we possess. When the average man is convinced that he is getting a square deal he is a pleasant fellow to trade with. Then the service he purchases is more valuable

because more satisfactory to him, and his patronage is worth more to the one who receives it.

DISCUSSION.

After the applause had subsided, which followed the reading of the above paper, President Guffey said: I am sure every member present joins me in thanking Mr. Lansley for the very able paper he has furnished to the membership of this Association. I think we can now show our appreciation of the same by a free and generous discussion of the ideas contained therein. The paper is now before you. It ought to receive a thorough discussion commensurate with the importance of the subject with which it treats. Is Mr. Milt Saul present? We would like to hear from him.

MR. MILT SAUL: Mr. President and Gentlemen, I do not know that there is anything that can be added to the splendid paper prepared and just read by Mr. Lansley. The only suggestion probably, or the best suggestion I could make is that we all take that paper and study it very seriously and very carefully. We all ought to give it our most careful and deliberate consideration.

Throughout the gas industry — the manufacturing gas industry as well as the natural gas industry there are a number of former newspaper men. I am one of them. We have noticed a number of times in the past few years the admirable papers that Mr. Lansley has prepared. It has been unanimous among the former newspaper men now engaged in this industry, that he always gives accurate advice on matters of publicity. It is a source of a great deal of satisfaction to those men to get the publicity suggestions he makes.

Now I mention the former newspaper men solely for the reason that they are experienced, — probably more experienced in publicity matters than the rest of us.

There are two points in Mr. Lansley's paper that I would like very much to emphasize. He brought them out very admirably. One of them is the importance of reiteration in matters of publicity, and truthful publicity for the public. It can-

not be stated too often, nor too continuously, this matter of publicity that you wish the public to get and to appreciate. As an illustration, take the case of a political party, or a candidate for office. He wishes the public to be informed. You will find that for months in advance of the election the greatest amount of publicity and advertising will be expended in order to inform the public. The publicity managers of a political movement, they do not advertise once and then stop. They do not take a shot with one form of publicity only, but they keep it up continuously for weeks and even then the public is not thoroughly informed at the close of the campaign.

Now, in matters of a more technical nature, such as the natural gas business and matters pertaining to the use of gas in all of its various forms, it cannot be expected that the public will understand what its advantages are or what its economics are unless it is told repeatedly. So I would suggest in connection with Mr. Lansley's paper that each company here and the representatives of each company here decide to put advertising and publicity on its pay roll as a definite item of regular expense and employ it as a definite working force as you would your auditors or your bookkeepers or your salesmen.

Publicity is not a matter of secondary importance. It is of primary importance. You must inform the public and keep them informed as to your policy; as to the advantages of the article you have for sale; as to the service you offer the public in the use of the commodity you are furnishing. It is not a thing to be treated lightly as Mr. Lansley so admirably puts it.

Now, there is just one other point I would like to call attention to. He has stated that the managers of companies can help in publicity matters by activities in various lines in the community. It was my good fortune once to be connected with a public utility company that tried out that policy. It insisted that its men join in the various civic movements; the Chamber of Commerce; the different improvement associations; the social clubs. Every movement of public interest had one of our men in it to represent the company; and whatever campaign of publicity the company was waging at that time, was backed up by the personal publicity on the part of these representatives in

these prominent places, and connected with these popular movements. If the Company had any matter up before a Commission and was carrying advertising matter, — publicity matter in the newspapers, our own men were at points where the men of the community gathered, and when they discussed these things they were there to enlarge on them and to help educate the public in this way. They led the community to believe that what the Company was saying in the newspapers was true; was correct. They were there to explain, and it was not very long until this Company that I have in mind was the most popular institution in town. That was because of their campaign of publicity and the way they went about it. Its best men were representing it where other men gathered to discuss such matters and all of its matters were talked of publicly in these places and the public got a good opinion of the Company and to this day that good opinion is maintained. Now I would suggest to take Mr. Lansley's paper, on account of its very fine, technical value, and study it and make up your minds to put the important item of advertising and publicity on your payroll and back it up by personal publicity throughout the community. I thank you (applause).

President Guffey: We would now like to hear from Mr. Hoover of Cincinnati, Ohio. What have you to say on this subject?

Mr. H. J. Hoover: Mr. President and Gentlemen; some of us, whose particular work in the gas industry has been to deal with the public, have long recognized the importance of constant and efficient publicity. At nearly every meeting, we have had some paper and some discussion of this matter. Some of us have been pioneers in an effort to instill into the minds of the officials of these companies the necessity of honest publicity. I do not believe that anything can be added to or taken away from Mr. Lansley's most excellent paper. I think it can be truthfully said that it is the most thoroughly prepared and the most carefully developed treatment of the subject of publicity that has ever been presented to a natural gas convention. I heartily endorse what Mr. Saul has said, that we take it home and study it and see that every official connected with the Com-

pany digest it thoroughly. It contains in every paragraph food for thought. It treats of a subject that should be acted upon and if acted upon, it will bring results and good results. I think that Mr. Saul has stated a very important matter, in a very concise way, when he said that publicity should be put upon every company's pay roll. The expense of publicity should be part of every gas company's expenditures, just the same as the salary or compensation of any employee should be a part and parcel of that expense. We may not be able to point to direct results, but we do know that it does bring results. Last winter we all experienced shortages of gas in our several communities. I believe that anyone who came in contact with the public and explained the conditions under which we were operating and the gigantic propositions we have to meet and the impossibility of rendering adequate service under existing conditions, after these explanations, could not help but be impressed by the advantages of honest publicity. After explaining our difficulties we were almost universally met by the statement from our patrons and customers "Why do you not tell that to the public?" "We understand it now, but why don't you tell it to the public?" We should take the public into our confidence and when these matters are explained to the public, we are sure it will have the effect of minimizing criticism (applause).

PRESIDENT GUFFEY: If Mr. Frederick W. Stone, Manager Ashtabula Gas Company is present, we would like to hear from him.

MR. FREDERICK W. STONE: About all I can say, Mr. President and gentlemen, is that I heartily coincide with the views as expressed in the paper just read and with the remarks that have been made by the gentleman who has just preceded me. When I heard Mr. Lansley read his most excellent paper, I was reminded of a remark I heard made at Cleveland three or four weeks ago with regard to a speech to which we had just listened. In going away from the place of meeting I heard one man make this concise and pointed remark: "Well, that fellow certainly knows his business; he knows what he is talking about." As I say, when I heard Mr. Lansley read his paper, I felt the same way about it. It goes without saying that he knows his

business and he knows what he is talking about. I suppose any one managing a gas company has been up against the proposition that when he has had trouble he feels that the newspapers jump on to him. If there is a breakage in the line; if there is any shortage of gas or anything of that kind, the newspapers are usually anxious to tell the people about it, or at least to the gas manager it seems that they are apparently anxious to tell their readers all about it and the gas manager usually feels that the newspaper man gives the story undue prominence by its location in the paper. On the other hand, if your service has been good throughout the whole year, the newspapers do not say anything about it and when you go to the Editor and ask him to put in something praiseworthy about the gas company, he receives you with an indifference so that when you go away from him you are inclined to feel a little sore at him because he does not do as you want him to do. I think that is caused by the different viewpoint by which we consider the matter and it all turns on what, in the eyes of the newspaper man, is news and what is not news and upon what, in the mind of the gas manager, would be news from his standpoint. To the newspaper man, whatever is interesting, startling and strange, that will be read eagerly by the people, is regarded as news from the newspaper standpoint and that is the reason they print things that is possibly adverse to the gas company or give mention to some unusual occurrence in connection with the gas company's business. We must all remember that if we do things well, that is simply something that is expected of us and it is not news at all. Consequently the newspaper man will not print it or at least he will not print it free of charge. If the newspaper man will not print good news on behalf of the gas company free of charge, it seems to me it is up to the gas company to pay for it over their own name. If you are man enough to say anything, then be man enough to sign your name to it and to say that it is so and to stand back of it. That is the kind of work we have to do in connection with publicity work as far as gas companies are concerned. I know that some gas companies give too much importance to the cost of such publicity work. I am not one who would undertake to set any limit to which a gas

company should go or ought not go in the matter of paid publicity nor would I attempt to say that they should expend any stated amount in their publicity work. But it would be sort of an inspiration to some of us probably if we were to take into consideration and give due weight to this item of expenditure in the electric light business. The electrical interests last year averaged, by way of expenditure in paid publicity something like three per cent of gross receipts. That shows the faith they have in paid publicity. Of course, we could not afford to do anything of that kind. At least, we could not work ourselves up in our present state of lethargy to the belief that we could afford to do it. However, it will give us something to think about for it is a field of endeavor which we are going to have to take advantage of more and more in order to let the people know the advantages of the product we are offering for sale. We must not necessarily think of the cost and the cost only, but we must take into account on the other side of the ledger the results to be obtained. Of course you cannot always measure the results of publicity. As stated before, you have to hammer and hammer and hammer before you can begin to notice results. I wonder if anyone here has ever changed the location of his office and has realized how long a time has to intervene before the public generally become aware of the change? For example, if they have changed the office of the company from Jones Street over to Brown Street, they will find that some people will continue to go to Jones Street for three or four years in order to pay their gas bills and that in spite of the fact that the change has been freely advertised. The people read an item of that kind and then forget it. If you do not tell it in a half a dozen different ways and as many different times, they will not remember it. This illustrates the necessity of keeping continually at it. Constant repetition of this campaign of publicity is necessary in order to obtain the best results for it keeps you before the public all the time and keeps you before them in the way that you want to be kept.

Now there is another matter that I want to mention, although I do not know that I should take so much of your time. However, it is upon my mind. We sometimes think that news-

paper advertising is not read. There was a time when I thought so and so two or three years ago — about two years ago now — I undertook to test the efficiency of newspaper advertising. I went down our customer's ledger and I picked out every tenth name until I had 500 names. Now those 500 names picked in that way would represent an average of the people in the community because they were, as I say, one out of every 10 of our regular customers. I sent them a letter with a return envelope in it and a little form sheet for them to fill out. I asked them if they read the advertisements which were being put out by the gas company and if so, whether they thought they were any good, and also if they could offer any suggestions as to the future advertising by the company. Out of the 500 letters I got 231 replies. That was nearly 50 per cent. Someone familiar with the work told me afterwards that that meant that at least two-thirds of the advertisements were read because there were lots of people that would get such a letter who would not answer it; who would lay it off to one side and think they would answer it after while, but they would not answer it at that particular time and probably it afterwards escaped their memory and it would not be answered at all. Therefore, I am convinced that newspaper advertisements are read more generally than we often times think they are read. I believe that is all I have to say, Mr. President, except to emphasize the fact that if we simply put an advertisement or a statement in the paper we will say once a year, or even once a month, it does not amount to anything because to get the full benefit from honest publicity, you have to keep at it constantly. It must be a regular campaign followed up methodically. I thank you (applause).

President Guffey: We would like to hear from Mr. Brown, New Business Manager, The Ohio Fuel Supply Company.

Mr. W. Re. Brown: Mr. President and gentlemen; As Mr. Lansley has said, I really believe what is necessary today is not to discuss the details of publicity here but to try and enthuse the members of the association so that they will be made to believe that publicity is as much a part of the gas business as gas itself.

The Ohio Fuel Supply Company started a publicity campaign

some five years ago and I was selected to look after this department by the company. As a result of that campaign of publicity, we have issue a little paper called "The Gas Magazine". A number of you have seen copies of this Magazine in the convention hall. We feel that has proved to be one of the best methods for publicity and for telling our side of the story to the public. Copies of that Magazine have been placed upon the seats in the hall today so that each member here present can examine the magazine and see the work we are undertaking to do. I do not know that there is anything further I want to say with reference to it. We think the magazine speaks for itself. I have been engaged, as I say, in this work of publicity for several years and if there is anything about it that any member here wishes to ask me, I will be glad to furnish what knowledge I may have gained from this experience. If anyone is desirous to know what success we have had with a publication of that kind, I will be very glad to answer any and all questions with reference to this all-important subject.

Supplementing this most excellent and valuable paper by Mr. Lansley, which has been read to us today, I would like to read to you in this connection what Mr. George W. Perkins has said with reference to this matter. I believe everybody admits that he is one of the most successful business men in America. He has handled a number of big things and certainly, what he has to say on this subject should carry great weight with it. I believe if I read what Mr. Perkins has said about publicity, it will give us a lot more enthusiasm and courage to take up the work and push it persistenly and methodically. Last month, in an address before the Bureau of Advertising of the American Newspaper Publishers' Association at its annual luncheon at the Waldorf-Astoria in New York, he said:

"The more I see of advertising, the more I am for it. The institutions with which I have been connected during the past twenty-five years have spent millions of dollars to inform the people upon matters of importance concerning their affairs.

"The more I have studied, worked with and seen the results of full, frank and complete publicity the more I have come to believe that it is almost a cure-all for many of our modern business ills. I believe

that the reason why publicity in our day and generation can accomplish so much is primarily because of the intelligence and fair-mindedness of our people. I believe that all our people, as a whole, want or ask for is a fair, square deal. They do not expect managers of business concerns to be infallible; they know they are human and liable to make mistakes; but the people want to know how their business managers handle the affairs entrusted to them.

"We Americans are not afraid of things simply because they are big, provided that they are big in the open, above-board; but we are afraid of large aggregates of secretive, blind-pool methods. And it is largely because of secretive, blind-pool methods that our people have been afraid of large aggregates of capital under what is known as corporate control.

"So far as complete publicity has been practiced in our large industrial corporations it has been equally successful. Is it not high time, therefore, that we gave more thought to, and applied in a more practical way, the principles of publicity in our industrial and political affairs? I stand for and believe in publicity — full, frank and complete."

Now, gentlemen, those are the words of a man who has been a successful business man engaged in big things. I believe if he were in this audience today and were to get up and give you a little advice on a financial matter by way of investments, a lot of you would slip out and go over to your broker's and invest a little money on that advice, thus showing in a practical way your estimate of the man. He says that the concerns with which he is connected have spent millions of dollars to put their companies in the proper light before the public. As I said before, we feel we have had success in the publications we have gotten out under the name of The Gas Magazine. It was started four years ago and we have been hammering away every month just to bring before the public the things that Mr. Lansley, in his paper, has advised us to tell the people. To be sure, we have tried to sugar-coat the dose so that the public would read it. We must remember that the public is not interested in our business or in what we are doing so long as we are meeting the demands of the public with reference to service. Therefore, it is important that we make them interested when we are rendering good service. Whatever we have to tell them must be told in such a manner that they will read it and remember it. It must not be forced down like a dose of castor oil but it must be sugar-coated so that they will

want to take it and are imbibing it without knowing that it is a medicine. I do not know that there is anything further that I can say. In fact, I think it is a matter that needs no further discussion after the comprehensive and lucid exposition of the subject as made by Mr. Lansley. If, however, there is anything that any of you gentlemen would like to ask regarding what we have done along this line of publicity, I would be very glad to answer to the best of my ability. I thank you (applause).

MR. GEORGE YARDLEY: I would like to ask what particular form of advertising gives the best results?

MR. W. RE. BROWN: I agree practically with everything that Mr. Lansley has said regarding newspaper advertising as a convenient and successful medium for reaching the public. That, I think, is one of the best methods of getting what you have to say before the public in the way you want it said. With reference to the situation of the Ohio Fuel Supply, I may say there are a number of small towns in which we do business and probably the greatest argument in favor of the Magazine method is the economy with which full, frank publicity can be employed so that the published matter gets into the hands of the consumer over this extended territory. In our case, we could not have gotten anything like the extent of publicity from ordinary newspaper advertising for the same cost we have had in publishing and distributing "The Gas Magazine." However, I endorse everything that Mr. Lansley has said as to the merits of newspaper advertising. I can certify to that from my own experience.

MR. GEORGE YARDLEY: How is this magazine distributed?

MR. W. RE. BROWN: These magazines are mailed with the gas bill. We have two different methods of distribution. For a number of years they were distributed by the meter readers in the various towns in which we were furnishing gas. In this way our magazine was distributed from house to house to each patron in each town. Now, we are pursuing the method of mailing the magazine with the gas bill.

If there is any other inquiry from any member present, I will be glad to furnish whatever information I can. I thank you (applause).

PRESIDENT GUFFEY: We have with us this morning one of our most distinguished legal representatives and I am going to take the liberty of calling upon him to discuss this matter from his view point. I am sure we would all be glad to hear from Judge Douglas, General Counsel, Logan Natural Gas & Fuel Company, Mansfield, Ohio. (Applause).

HON. S. M. DOUGLAS: Mr. President, and members of The Natural Gas Association of America: It would certainly be presumptuous for me or anyone else who has not given this matter special attention, in view of the long experience and the splendid results that the author of this paper has given to us in the address just made by him, to attempt to add one thing to it because it covers the entire situation in a most complete and comprehensive way. As he has said — and indeed the key note of his paper was, although I did not have the pleasure of reading it before, — the kind of publicity should always be truthful publicity and then to keep hammering at it persistently and insistently so that the public is taught to appreciate the importance of the subject and the full and frank manner in which you present your side of the question. Those are things that we ought to remember. Truthful publicity and keeping at it and keeping at it. As was illustrated by Mr. Stone, people are more or less creatures of habit and if a thing is not upon their minds unless you keep telling them and telling them, they will forget it; they will not appreciate the importance of it at first; they will keep thinking along old lines just like the patrons that he spoke of who continued to go to the office of the company on Jones Street, when, as a matter of fact, they knew, or ought to have known, that for a number of years the office had been removed to Brown Street, and the public had been duly advised of the change of location at the time it was made.

Now publicity is important, — why? The right kind of publicity is important, — why? Because it ramifies every department of the natural gas business. Take, for example, Mr. Denning and myself and all the attorneys who have to do with the natural gas business. We have to contend constantly against the prejudice that results from ignorance, from lack of information, from absence of honest publicity. That poisonous virus

creeps in and affects every jury and even unconsciously affects the court. It affects the witnesses, not only of the opposition but often times our own witnesses. If the information is the wrong kind and if it has not been corrected by honest publicity, it presents obstacles that are difficult to surmount. Therefore, it is highly essential even in our department of the natural gas business to see to it that correct information is given to the public. We must cultivate the brains of the people into a correct view of the true situation. When we have that kind of truthful publicity that is not simply some gauzy sham or pretense but is honest, is frank, and is complete and when we have continued that campaign of honest publicity until the public is fully informed, then our work will be much easier. That is the only kind of publicity that pays. When you educate the brains of a community by correct public sentiment it gets rid of ignorance, it destroys prejudice, it brings enlightenment where formerly there was darkness. Truthful publicity means a square deal; honest publicity insures justice. You can rely on the public, if they are fully and completely informed, in doing the right thing. It is not only important — this matter of publicity from the standpoint of the operating department, but it is equally important, if not more important to the legal department which deals more directly with the public in matters that are controlled by public sentiment. If, on the other hand, you have a credulous public controlled by ignorance, there is not a single department, there is not a single feature connected with the natural gas business that is not up against a good, big, stiff proposition when we come before the public and ask for a square deal. We all know what adverse public sentiment is. However, I am glad to say that conditions have changed and mightily changed in the last few years. The people have gotten to understand that what we want and what we must have in order to continue in this business is only a square deal and it is just such papers as this, prepared and presented by Mr. Lansley, that assist us immeasurably in bringing public opinion around more equally to our point of view. Every line of it is replete with valuable suggestions. It is the best prepared article I have

ever heard on this all-important topic. It is temperate. It is not radical. It is convincing and above all it tells the truth.

In conclusion, the thing for us to do is to keep on hammering along this line of truthful publicity. I thank you (applause).

PRESIDENT GUFFEY: We will be glad to hear from any other member on this subject. The paper is before you for discussion. A full and frank discussion of the subject is invited. Do not hesitate. I will call on Mr. Denning, General Counsel Ohio Fuel Supply Company.

MR. L. B. DENNING: If I may be permitted a word Mr. Chairman and gentlemen ; I have not had an opportnuity to fully digest Mr. Lansley's paper, but in hearing it read I want to endorse practically every sentiment he has expressed. I want, however, to make this suggestion. I think we lay too much stress upon publicity and truthful publicity. To fully illustrate my meaning by a concrete case that comes to my mind, just before I left home I received a newspaper published in one of the smaller towns in which one of the companies I am connected with is doing business. A rate controversy is on down there and in this newspaper was a statement like this, that this particular company was buying gas in the field at six cents and asking the consumer to pay thirty cents. Now it may be said that that was truthful publicity, it was publicity, and it was truthful publicity, but it was not helpful. It was not intelligent advertising. To my mind, the function of a gas company is primarily that of salesmanship. We are producing and selling an article, — a commodity. We are rendering a service if you will. At the bottom, is the fact that we have a commodity which we produce and sell. I do not see any reason why the rules of ordinary business should not be applied to the conduct of the natural gas business in its relation to the public. If A and B produce a new soap or a new type of machine, the first thing they do is to study the market and they attempt to reach that portion of the public in whose minds they want to create a desire to buy that soap or that machine or that article. The gas company, however, cannot reach its patrons through personal touch and personal contact. Take the average town of five or six hundred

consumers, it is an impossibility for anyone or any number of the individuals engaged by the company in operating its business to know them all. Take the manager who sits in his swivel chair at a desk and it is impossible for him to know personally the patrons who are to buy the articles he offers to sell. He can, however, reach them in an intelligent way through the public prints. That, of course, is publicity. To my mind after all it should be intelligent advertising. What we should bend our efforts toward is the matter of intelligent advertising. Now we all know or we should know what our costs are in doing business. We all know — and some of us painfully so — the increase in the price of everything we are compelled to buy. We also know or should know if we know our business, and I assume we do, that the service we are rendering to the patrons to whom we sell this commodity is remarkably cheap when viewed from the standpoint of the cost of its equivalent. The equivalent cannot be purchased for less than three to four times what we are charging for our commodity. To my mind I do not see any reason on earth why we should not let the public have this important piece of information, and if necessary paid publicity should be the means of informing the public of this fact. I do not see any reason why we should not tell the public and tell them properly the value of our product measured from the standpoint of the cost of its equivalent. I see no reason why we should not bring that to the attention of the public at once. After all, what we want to do and the central idea of it all is to inform the minds of our patrons of the value and worth of our service and what it would cost them to get it in an equivalent service and to bring to their attention the fact that we are doing everything to render them good service in the production and sale of the commodity which we are handling. Therefore, I say I believe after all what we really need is not publicity in the sense in which it is sometimes used. You may say it is merely a juggle of words. To my mind I do not think it is. There is a distinct difference in the meaning of the two terms, intelligent advertising and publicity. Intelligent advertising is a field which should be developed and developed rapidly by the natural gas companies. The public should be informed of the difficulties encountered in furnishing

this commodity in their homes and places of business and ready to serve their demands. The comfort and convenience of that commodity should be brought to the public attention by judicious and intelligent advertising. The consumer should know what we are doing and why we are doing it and how we are doing it and who we are doing it for. Doing it first for ourselves and secondly for the consumer but that both sustain and must necessarily sustain a mutual relation; both must get benefit from it, for no trade is a good trade unless both sides are benefitted. (Applause).

President Guffey: Any further questions on this paper? If not I am going to call on Mr. Holbrook, as President of the Association of Natural Gas Supply Men, who has some announcements to make. I will ask him to come forward so that every member can hear.

Mr. David O. Holbrook: Gentlemen, as President of the Supply Men's Association, I want to impress upon you, if possible, the absolute necessity of getting your tickets for the beef steak dinner at the earliest possible moment. The unusually and unexpectedly large attendance here will compel us to stop selling tickets when the capacity of the hall is taken. Last year in Pittsburgh, many were disappointed because they could not get in. We have, as noted on the program, arranged for your entertainment on Wednesday evening in the room immediately above the convention all — a beef steak dinner — and the entertainment will be of such a character that those who miss it will be very, very sorry. When we have disposed of the number of tickets representing the seating capacity of the banquet hall, it will be impossible to get any more whether you come around and say you have lost yours or not. You cannot get them. So get your tickets as early as you possibly can.

At two o'clock this afternoon, from immediately in front of this hall, special cars will be run for a trip to Niagara Falls and the Gorge Route. It is necessary that you have both the ticket which came with your badge and your badge in order to take advantage of this trip. We will return to Niagara Falls at about 5 o'clock and on Prospect Point the annual picture will be

taken. So that if you care to be in the picture you better go on the trip.

On Tuesday night — tonight, the exhibit hall will be open for the examination of exhibits by the members of the Association and by the public. The Iroquois Natural Gas Company has provided a band and a moving picture entertainment and have invited the public to come down and look over our exhibits. Coming back from Niagara Falls at 5 o'clock, arrangements have been made with the Street Car Company so that you can return on any of the regular cars leaving at your own pleasure and discretion. It is not necessary to come straight through but you can spend an hour or two at the Falls if you care to.

Now as Resident Secretary of the Natural Gas Association, I want to say a word or two in regard to the distribution of papers. After tomorrow a complete set of the papers can be obtained at the registration booth. The papers each day will be provided for the session of the Association in which the papers will be ready but if any of you care to have a complete set of them, after those in attendance have been taken care of, if you will call at the registration booth you can get them. I thank you.

I overlooked a bet. A luncheon will be served each day in the exhibit hall. I think most of you discovered that fact yesterday.

Presiding Guffey: Before calling on Mr. Adams for the final paper at the morning session, I desire to make an announcement. Tomorrow we have upon our program three papers. One on the subject of Rates, by Mr. Leslie B. Denning, President, Lone Star Gas Company, another on Mixed Artificial and Natural Distribution in Cities, by Mr. A. B. Macbeth, General Manager, Southern California Gas Company and the last paper is on the subject "Efficiency in the operation of gas compressing stations" by Mr. T. R. Weymouth, Chief Engineer United Natural Gas Company.

It gives me great pleasure to say in addition to that we are going to be honored tomorrow by the presence of Mr. A. C. Bedford, President of the Hope Natural Gas Company, and President of the Standard Oil Company of New Jersey, who will speak to us on the subject of "Mobilizing Industry for War"

(great applause). Mr. Bedford, as some of you, although perhaps not all of you, know, at the present time is Chairman of the sub-committee of the Council on National Defense which sub-committee has charge of all the oil, gas and petroleum matters connected with the preparedness move and I am sure he will give us an address tomorrow that will be highly interesting and very instructive.

MR. J. M. GARARD: Mr. President, I move you that a vote of thanks be tendered to Mr. John W. Lansley for his very valuable paper.

MR. HENRY S. NORRIS: I take great pleasure in seconding the motion.

The above motion having been duly seconded was then unanimously adopted.

PRESIDENT GUFFEY: Gentlemen, it gives me great pleasure now to call upon Mr. Larmour Adams, Secretary of the Association of Natural Gas Supply Men, who will read a paper on the subject "Co-operation between Buyer and Seller of Natural Gas Supplies" as prepared by the Board of Directors of that Association.

Mr. Larmour Adams, Secretary of the Association of Natural Gas Supply Men then read the following:

CO-OPERATION BETWEEN BUYER AND SELLER OF NATURAL GAS SUPPLIES.

PREPARED BY THE BOARD OF DIRECTORS OF THE ASSOCIATION OF NATURAL GAS SUPPLY MEN, AND READ BY LARMOUR ADAMS, SECRETARY.

At every meeting of the Directors of the Association of Natural Gas Supply Men which has been held, suggestions have been made which would lead to a closer relationship between the Natural Gas Association of America and the Supply Men's Association. Heretofore, the activities of the Supply Men's Association have been chiefly along lines of arranging for the exhibits held in connection with the meetings of the parent body.

The Supply Men feel that they can extend the scope of their usefulness to the parent association, and for this reason it was deemed advisable that the Board of Directors collectively prepare a paper for presentation at the Convention calling the attention of the members of the Natural Gas Association to

some few ways in which co-operation would be mutually beneficial.

I, as Secretary of the Association of the Natural Gas Supply Men, have been selected to read this paper, which embodies the views of the Directors of the Association which I represent.

We as manufacturers always welcome criticism, and we feel that the Gas Companies will also welcome criticism if it is of a constructive nature. We supply men realize the danger of making criticisms because we appreciate that some individuals may feel that they are being personally criticised. This is the furthest from our thoughts, as it is not the intention of the paper to deal with individuals, either sellers or buyers, but rather, to bring to the attention of those assembled some practices which have grown up in the gas business which should, for the benefit of both buyers and sellers, be discouraged if not eliminated.

You gentlemen while selling a commodity for which you are being paid are really giving to the ultimate consumer more than a commodity, in that you are furnishing a service, and any interruption of service works more to your detriment than if you were engaged in any other line of business. A grocer, a butcher, a coal merchant, or a steel manufacturer can fall down on his deliveries, and nothing will be said or thought of it. If, however, you fail to deliver gas to the consumer in the quantity which he thinks he should have, you are hauled before a Public Service Commission and made to explain. Interrupted service means not only local complaints which are disturbing to the local Manager, but very often a great expense must be incurred in order to make repairs in the very shortest possible time. Very often the necessity for these repairs could have been avoided if proper material had been purchased for the original installation. Too often, however, materials have been purchased on the basis of price alone. These materials answered their purpose for a time, but under heavy strain of increased pressure and unexpected demand, they have failed, and as a consequence the Gas Company has been blamed for their failure to deliver gas at the time when it was most needed.

Every gas man knows that it costs more in money to make

a repair than it does to make the original installation, and it is our purpose in presenting this paper to the members of this Association to ask for their co-operation in the purchase of the supplies best suited for the work required. No manufacturer can continue to make first-class goods without a profit. Every successful manufacturer knows his approximate cost. He is entitled to a legitimate profit. His experience and good judgment lead him to believe that his device is superior to a lower priced article, and his natural desire is to uphold his quality, which can only be done by upholding his price. Constant loss in business soon drives him to meet competition, and here is one place where the old saying that "Competition is the life of trade" is a fallacy. In too many instances, competition is the death of trade, for competition in price without reference to quality is the surest means of ultimate dissatisfaction on the part of the consumer.

The consideration of price rather than quality we fear exists to a greater extent than is generally known. The efficiency of a purchasing department is too often judged on the comparative cost of material rather than the efficiency of the material bought. In other words, if the purchasing agent can show that his discounts are greater than those of his predecessor, he feels that he is doing his work to a better advantage than his predecessor. This is not always the case, and too often the field expense incurred through the use of the lower priced material eats up the saving effected in the purchase many times, to say nothing of the interruption in service and the loss of income.

In some instances there is not sufficient co-operation between the man buying natural gas supplies and the man using them. This is a bold statement on the part of the supply men, and a statement that will be criticised by many purchasing agents, but collectively we feel that this statement is well worth the serious consideration of the men here assembled. Is the purchase of supplies on which the very life and continued prosperity of your business depends in the hands of men who know why they are buying certain materials? Do they know the duty required of the articles which they are purchasing?

Too many purchasing agents of gas companies are so hampered with details and with the many perplexities of secur-

ing deliveries, that they are unable to devote the attention necessary to proper consideration of the use to which the articles purchased will be put. This is not the fault of the buyer, because every purchasing agent is ambitious to buy articles which will give satisfaction, but in many instances the necessity for attention to small details is such that they are kept constantly busy and cannot go into the important matters with the thoroughness and carefulness that they deserve. If the executives would insist that the purchasing agent so arrange his work that he could visit the warehouses and fields at stated intervals, it would, we feel, work out to the advantage of both the buyer and the seller, and have a tendency towards that co-operation which will lead to the consideration of quality as well as price in the purchasing of supplies.

Every manufacturer has in his employ men who know thoroughly the articles which he is selling. The manufacturer's very existence depends upon his ability to secure repeat orders. This salesman is in touch with factory conditions, and oftentimes better qualified than the ordinary buyer to know what is best suited for the buyer's requirements. He will recommend an article which he knows will give satisfaction and be met with the remark, "No, your price is too high." The buyer does not know why the price is too high and probably does not know why the article suggested costs more than the one offered at a lower price. This condition ought not to prevail to the extent which it now does.

Quality with a reasonable price is a combination most to be sought for, and the buyer who looks for price first, and makes quality the second consideration is not rendering full and proper service to the company from which he is drawing his salary. If an analysis of cost be made which will show the expense of replacement in the field and this is submitted to the purchasing department, it would very soon educate many of the buyers whose sole thought apparently is first cost.

The Natural Gas Companies are selling service, and the more and oftener they call the attention of their customers to this fact, the sooner they will be able to obtain a reasonable price for their commodity. The manufacturer of supplies is

also selling a service, and in direct proportion to his ability and willingness to furnish this service, he is entitled to recompense.

It is not always the largest manufacturer who can best serve the interest of the customer. The small manufacturer should not be handicapped because of his lack of size, but should be encouraged in every possible way, if his device is one of merit. He should not be discouraged by being made to sell his product at a price lower than that of the article now in use, if in the judgment of capable men, he has a device worthy of consideration. Too often the manufacturer is to blame for the price cutting evil, and this is especially true of the small struggling manufacturer who must make sales in order to meet payroll expenses, and who, with a device of merit is forced to sell it at factory cost, and then in order to meet his overhead expenses cheapen his quality in order to continue in business. The small manufacturer should be encouraged even to the extent of being paid a somewhat higher price, if the device is one of merit, for it is often only by the encouragement of manufacturers of this class that devices are developed, which ultimately result in great saving to the gas companies. If the manufacturer has spent long hours in thought and much money in developing an article which is superior to any other on the market, he is entitled to a legitimate return and fair profit in the price of the article developed. In no other way can advancement be made. Co-operation between maker and user will work to the ultimate advantage of both. If the user will explain exactly the services required of the article desired, the manufacturer can oftentimes, with a full knowledge of conditions under which the article is to be used, develop devices which will work for economy in operation. In this development work he will of necessity go to an expense on which he is entitled to a fair return. As the demand for this article increases, the price will, within certain limits, decrease, but unless the manufacturer can obtain a fair legitimate profit, it is not human to expect him to spend his time and his money to attempt to bring out improved devices.

Supplies should be purchased on the same basis as other important features which enter into the success of a gas company. No executive officer of a corporation could hold his posi-

tion if he would choose his assistants on the basis of price alone, and yet many good superintendents have had their efficiency lowered and their lives shortened because they are furnished with inefficient and short lived supplies. A good workman requires good tools. A field man wants and must have good materials and if he is constantly furnished with cheap junk, he will soon lose interest in his work, and blame all his trouble, whether properly or not, on the fact that he cannot keep up his lines because he is not being furnished with proper materials.

While we supply men are seeking co-operation with buyers of our material, we feel that many times there should be greater co-operation in the different departments of the gas companies. Too often the manufacturer of a high grade and high priced article, who has constantly lost business in the office of the gas company, is discouraged when he asks for permission to visit the man who is actually using the article which he has for sale. This may be a necessary rule, but oftentimes the buyer is not fully informed as to existing conditions, and it would undoubtedly accrue to the benefit of the gas companies if the salesmen who are specialists in their line were given an opportunity to take up the question of the purchase with the actual user of his device.

While we as manufacturers suggest for your consideration the granting of permission in some cases to our representatives to call upon the actual users of our materials, there is another phase of this subject which is even more important along the lines of co-operation, and that is, having the men actually using the article visit the plant in which these articles are made. If the gas companies are encountering trouble along any line, the manufacturer of the device giving the trouble, or the manufacturer of a similar device will be only too glad to welcome any representative of the gas company at the factory. Here the troubles of the operating man can be gone into with men trained in the manufacture, and oftentimes great mutual good can be accomplished. No manufacturer could possibly maintain an organization which would enable him to send out his best trained men to every place where trouble is occurring, or is apt to occur. The loss of time from the shop would be one im-

portant item, the matter of expense must be considered, and the possibilities of not finding the proper man on the job would oftentimes work to the disadvantage of both the manufacturer and the customer. If the gas companies would send men to the factory, the benefits derived not only in the clearing up of the special problem involved at the time, but the general educational value of such a visit would accrue to the benefit of the gas companies. It would be well, of course, to arrange for such a visit in advance so that no time would be wasted, and so that arrangements could be made to enable the visiting gas man to receive the attention which the manufacturer would be very glad to accord to him. The definite benefits of such visits have been demonstrated in many cases, and we trust that the gas companies will appreciate the value of educating their men along these lines.

Some purchasing agents, realizing that quality does count for something, insist upon seeing samples of the goods offered. This is all right as far as it goes, but he sees too often only the surface and finish of the article. The real worth can only be determined by actual use. For this reason, if for no other, the standing of the manufacturer as well as the appearance of the product should be taken into account.

The low first cost sometimes turns out to be a very high price when measured by results, or rather, by lack of results. It was E. C. Simmons, the founder and head of one of the greatest hardware firms in the United States who coined the slogan "Remembrance of quality remains long after the price is forgotten." This slogan undoubtedly should be indelibly impressed upon the memory of every salesman, and is well worth a prominent place on the wall of the office of every purchasing agent. Why organizations striving for efficiency will purchase goods on account of low price, leaving quality to faith or to chance, is beyond comprehension. The argument may be, and often is advanced, that it is good business to play one seller against another to secure lower prices for a standard article, and perhaps place an order with concerns carrying a limited stock, or possibly no stock at all, at a price just a little below the market. But is this good business? All concerns in business must make a profit, or soon go into the hands of the sheriff. Grant

that a cut price seller does occasionally save you a little money on standard or trade marked goods. He must make up his lost profit either from you or from some one else, or else fail in business. Materials cannot be sold at cut rate prices continuously and to all buyers, and at the same time meet running expenses and earn a profit on the business.

The value of the supplies purchased this year by natural gas and allied interests will exceed $150,000,000. Stop for a moment and consider that in the expenditure of this vast sum of money co-operation is absolutely necessary if this money is to be expended to the best possible advantage. The condition which we hope will eventually prevail cannot be brought about in a day or a year. It may be that it can never be brought about, but we believe that the more consideration the gas companies give to the important subject of the consideration of quality, the better will be the condition of both the manufacturer of supplies and the purchaser of them.

Much more could be said on this important subject, but we do not wish to further impose upon your good nature or your time. We are indebted to Berton Braley, with whose poems many of you are no doubt familiar, for the way in which he has covered this subject in the following:

When the prehistoric caveman lived and struggled, long ago,
He was strong for independence as he wandered to and fro,
If he had a neighbor handy he would tear him limb from limb,
And the thought of social meetings never much appealed to him;
Till one day a wiser caveman — sort of prophet, priest and scribe,
Pointed out the simple merits of assembling in a tribe,
"Let us work and fight as brothers, with our strength combined," he said
"For we've got to get together if we want to get ahead."

So the caveman took his counsel, which is ample reason why
They were done with being cavemen as the centuries went by,
For the tribe became a kingdom which in turn became a state,
As men learned to know the meaning of the word "Co-operate"
They co-operated badly — they don't do it well today —
But at least it proved much better than the caveman's clumsy way,
They were on the road to progress, and their leaders wisely said,
"You have got to get together if you want to get ahead."

Man is slow to learn his lesson, but we're learning bit by bit,
That the way to grow and flourish is to use our strength and wit,
Not to battle with each other, but to help each other on,
That the paths may seem the smoother which we have to trudge upon;
Though at times there is reversion to the days of fang and claw,
We are slowly — aye, but surely — coming to the higher law,
Then we'll cease to brawl and bicker and we'll work as one, instead,
For we've got to get together if we want to get ahead.

Those who work with brain or muscle, those who buy and those who sell
If you hope to thrive and prosper in the world wherein you dwell,
You must learn co-operation, you must cease to work alone,
Why, the *caveman* stopped that nonsense, just the minute he was "shown"
Join your forces, be united, for the word is truly said,
You have got to get together if you want to get ahead.

The reading of the above paper was followed by a hearty round of applause, after which President Guffey said:

Gentlemen: I am sure we are all indebted to Mr. Adams and to the Association of Natural Gas Supply Men for the preparation of this very able and instructive paper. The discussion of it is now before the meeting. If anyone wishes to offer any suggestions in addition to the paper, or desires to discuss any feature contained in the paper, we will be glad to hear them at this time. If not, the meeting will stand adjourned until tomorrow morning at ten o'clock.

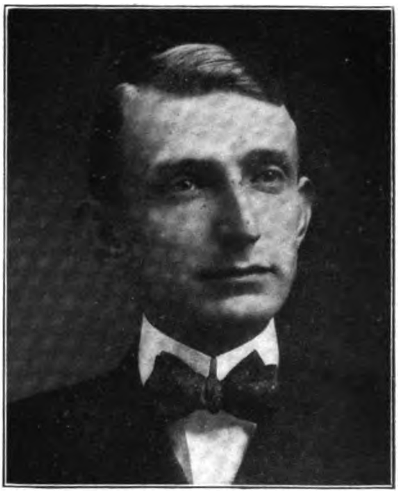
And thereupon the Association adjourned until Wednesday, May 16th, 1917, at 10 o'clock, A. M.

SECOND DAY — MORNING SESSION.

WEDNESDAY, MAY 16, 1917.

PRESIDENT GUFFEY: Kindly be seated, gentlemen, so that the convention can proceed with its business. The first paper this morning will be "Efficiency in the Operation of Gas Compressing Stations", by Mr. T. R. Weymouth, Chief Engineer, United Natural Gas Company.

Mr. T. R. Weymouth then read the following paper::



EFFICIENCY IN THE OPERATION OF GAS COMPRESSING STATIONS

By Thomas B. Weymouth.

In the early days of the natural gas business, when it became necessary to install compressing stations because of the decline in pressure of the producing field, the suddeness and magnitude of this pressure drop, coupled with the limited knowledge of the extent of the gas territory available, led to the general belief that therefore all equipment should be installed in a temporary fashion with the expenditure of as little money as possible. In spite of this belief, however, which should have indicated the necessity of installing apparatus permitting of the maximum of economy in operation, an examination of some of the old time gas pumping stations and their methods of operation reveals a prodigality which, in the light of our modern notions of efficiency and conservation of resources, seems wholly inexcusable. The simple, non-condensing slide valve engine was used whereas the Corliss compound condensing engine was readily

available, even if the gas engine was not at that early date thought to be in the state of development to warrant the confidence now reposed in it.

But it is in the method of operation that prevailed in some of the plants as installed ,where one can see an almost ludicrous waste. In one particular case a very large gas engine was installed to drive two compressor cylinders designed to compress two-stage in a single unit from atmospheric pressure to 300 pounds, the intermediate pressure to be about 60 pounds. It so happened that the pressure in the gas lines coming into the station from the field was about 125 pounds, and in order to meet the conditions for which the compressing outfit was designed, regulators were installed to reduce the field line pressure from 125 pounds to atmosphere, from which it was compressed to 60 pounds in the first stage of the machine and thence to 300 pounds in the second stage. This method of operation was pursued until the young engineer of the plant, unknown to the superintendent, connected a by-pass from the field lines into the suction line of the second stage compressor cylinder, short circuiting the regulators and permitting the gas to be compressed through a single stage from 125 pounds to 300 pounds, with a resultant fuel consumption less than half of that used originally, to say nothing of the saving in wear and tear on the machinery. It is interesting to note that when, some time later, the superintendent's secret agent duly reported the heresy of the engineer the latter was threatened with the loss of his position and ordered immediately to restore the former condition of operation.

Today, this practice is almost unknown, except in certain cases where it is necessary for short periods, to relieve the load temporarily on a unit that may be acting badly for one reason or another, but which cannot be shut down without crippling the service.

As an indication of the loss or waste occasioned by this practice, it may be noted that in throttling from 5 pounds gauge to atmosphere it requires 27 horsepower more to compress every million cubic feet of gas per day to 100 pounds gauge than it would if smaller compressors were installed or additional clear-

ance were introduced into the existing compressor cylinders in order to reduce their capacity sufficiently to permit them to compress from the original 5 pounds suction pressure. This corresponds to an increase or useless consumption of fuel of 24 per cent. Thus, if this operation were carried on continuously for the whole year, the annual loss would be $473, based on 20 cent gas, which if capitalized at 10 per cent, would justify the expenditure of $4730 for each million cubic feet capacity per day in supplying new cylinders or additions to the old ones.

Present day compressing stations are far in advance of the old-time stations in the matter of instruments provided for the engineers to use in keeping their machinery properly tuned up. In the early days the engine indicator was never used in many stations, whereas today it is considered indispensable in plants of any importance. Without this instrument the engineer can merely guess at the setting of his valves and the timing of the ignition of his engines, and with these matters not properly attended to a considerable waste of fuel is not only possible but is quite probable to occur.

Further than this, the station should be provided with proper gas measuring instruments on both main and fuel lines, preferably of the rate reading type, such as orifice meters, which are extremely simple in construction and readily permit of the adaptation of their capacity to the requirements by the installation of a plate of the proper size. With such a device any change in condition is instantly reflected in the instrument readings and unusual or undesirable occurrences are quickly discovered and can be remedied at once. These meters also give a record of total deliveries and fuel consumption for the day, which, in conjunction with the suction and discharge pressure records and speed readings of the pumps furnish a means of ascertaining the power developed in the compressor cylinders and the fuel rate per compressor horse-power-hour. The engineer thus is put in possession of a full knowledge of the commercial efficiency of his main units and is enabled to discover and remedy any drop in efficiency.

A word may not be out of place here with regard to the

method of rating compressor station operation. While to the directors of the company the matter of chief interest is the fuel consumed per unit of gas pumped and delivered, nevertheless to the operating engineer this figure, in itself, is of very little practical significance as it takes no account of the pressure range through which the compression takes place. It merely gives the total cost without furnishing any basis for comparison. The reason for this is that the fuel rate is dependent upon the compression range through which the gas is pumped, so that the only logical basis upon which to state this rate is the power developed within the compressing cylinder, called compressor horse-power-hours. This standard gives some degree of uniformity in the results obtained from time to time from any given plant, thus furnishing an index of its operating condition, and at the same time it affords a means of comparison of different plants of similar character.

Hand in hand with efficiency of operation is reliability of service, for if a station is efficiently operated it bespeaks an attention to details which necessarily also produces reliability. One of these details is represented by the practice of installing thermometers in the suction and discharge connections of the compressure. By experience the engineers become familiar with the temperatures that should prevail with specified pressure conditions, and any sudden increase in either temperature above the accustomed value indicates valve trouble which not only reduces the efficiency of the machine, but will eventually necessitate a shut-down, possibly at a time when it can least be permitted, with the added possibility of causing serious harm to the machinery. With the warning furnished by the thermometers, a suitable time may be selected for shut-down and the injury to the compressor prevented.

A prolific source of waste in compressor stations is frequently found in the method, or lack of method, prevailing in the oiling system. In one case familiar to the author, when a new engineer was placed in charge of a pumping station he saved an amount of money considerably in excess of his salary within one month after he took charge, merely by giving proper atten-

tion to oiling methods. A thorough study of this question is necessary in order to determine the right kind of oil to use as well as its proper rate of feed. It is also advisable to install some method for accounting for the oil consumed in order to prevent the formation of wasteful habits of handling it. This is properly a matter for the engineer of the plant to work out.

Mention has already been made of the desirability of providing indicators at compressing stations. In like manner it is the part of economy as well as a provision for dependability of service to see that engineers are supplied with plenty of good tools, for no man can be expected to keep his machinery in efficient and reliable operating condition without a sufficiency of tools to work with. It is also an excellent policy for the company to subscribe to an engineering publication for the operators of the plant, and to encourage all of the men to read it regularly for they obtain many good ideas in this manner and develop an interest in their plant and a degree of education that is always reflected in an improved physical condition of the station. This station can be further stimulated by offering a prize each year to the plant showing the best results in cases where a company operates more than one. The company with which the author is connected has recently adopted practice of giving two prizes a year—one in the spring for the plant showing the smallest percentage of time that the machinery was shut down while needed during the preceding year's run, and the other in the fall, for the plant showing the best physical condition as regards cleanliness and order and general upkeep. The incentive thus given the men for effective, conscientious work, and the appreciation of their efforts thus evidenced, have resulted in very marked improvement in all of the company's stations.

The interest of the operating engineers in the tangible results of their efforts can be further increased by working out operating cost records on a horse-power basis and acquainting the men with the results each month, for it creates a friendly rivalry among them and they naturally take a pride in showing good records. By having the men work up a great part of the

records themselves they soon acquire an accurate knowledge of the meaning of the figures produced.

The discussion thus far has dealt with the effects of operating details upon the efficiency of compressing stations. It is impossible, however, to attain a high degree of efficiency of any plant unless it is properly designed. In the first place it is well to remember that the two heavy items of operating expense are fuel and labor, the size of the plant determining which of these will be the larger. It is desirable, therefore, that machinery be installed that will use fuel in the most economical manner, and that the plant be so designed as to require a minimum of operating labor consistent with proper upkeep and reliability of service. For the elimination of every $1,000 per year in labor cost it is economy to spend $8,000 in investment, and by judicious foresight many dollars can thus be saved. In one case in mind, a plant that originally required 24 men to operate was rearranged, with the result that seven men later ran it with the same number of engines in operation. This necessitated the scrapping of two 1,000 horse-power engines but the results amply repaid the cost. This of course is an unusual case but well illustrates the principle involved.

The desirability of keeping the engines in proper adjustment for the saving of fuel has already been discussed. There is a minimum fuel rate, however, below which it is impossible to go by any sort of care or adjustment, depending upon the type and make of prime mover installed. Inasmuch as the fuel rate usually amounts to from two to eight or ten percent of the gas pumped it is well to give careful attention to this matter in designing a plant. It is becoming of constantly increasing importance, not only from the standpoint of efficiency, but also because of the rapidly decreasing ratio of supply to demand for natural gas, with the consequent necessity for conserving the supply as far as possible for the use of consumers rather than in the process of transporting it to market.

Owing to the availability of gas for fuel in gas compressing stations, the adoption of large gas engine driven compressors has become quite general, with most satisfactory results, almost

entirely displacing steam except in localities where coal is readily accessible at a cheap price. Where the use of a natural gas is imperative for this work, every possible effort should be made to so equip compressing stations as to save the maximum of gas.

One fruitful source of economy in this respect is to utilize the heat in the gas engine exhaust gases for various purposes about the plant. The extent of this waste heat may best be illustrated by an example. In the case of a 1,000 h. p. unit operating at full load with an economy of 10,000 B. t. u. per horsepower-hour, the heat carried away from the engine in the exhaust gases will be about 2,500 B. t. u. per h. p. at a temperature of about 1,000 degrees Fahrenheit. Of this heat, it is possible to recover about 20 percent, or 500 B. t. u. per horsepower,—a total of 500,000 B. t. u. for the unit. This is equivalent to almost 20 percent of the developed power of the engine, or 200 h. p.

The heat thus recovered may be utilized in various ways. It provides an excellent means of heating the station buildings and has been used by the author for this purpose for several years, thus eliminating the old heating boilers with their attendant danger and waste of fuel. This has been accomplished in two ways, the first of which was to carry the exhaust pipes through a closed conduit, permitting the fresh cold air to pass over them and thus become heated before entering the building. The second method, and the one now altogether used, consists in passing the exhaust gases through a specially designed hot water heater placed close to the engine, the water thus heated being allowed to circulate through direct radiators placed on the pump house floor.

Steam can be generated in this manner and utilized in various ways about the plant, such as in driving auxiliaries, additional gas compressors, or in absorption gasoline plants. The latter use is one of the most suitable, for the load variations of the gasoline plant follow closely those of the compressing station, thus producing a steady demand for the steam generated irrespective of seasons. If this method is pursued, the engine

jacket water can be utilized in the steam generator, thus recovering a portion of the heat ordinarily lost at this point.

Another possible source of heat recovery lies in utilizing the heat developed by the compression of the gas. This is especially applicable to small plants, as in the case of one built by the author, wherein the hot compressed gas is made to pass through a battery of two inch pipes in multiple, arranged vertically around the walls of the building. A by-pass was provided by means of which in warm weather these pipes are shunted, and, instead of going through them, the gas passes direct to a cooler before entering the main lines. This heating arrangement must be designed with sufficient cross sectional area in order not to introduce an excessive pressure drop, a precaution the importance of which has already been discussed.

In steam operated plants, whether using gas or coal for fuel there is abundant opportunity for increasing the efficiency by the installation of heat saving devices. In one actual case, the addition of a few coils of pipe in the uptake of a number of return tubular boilers so that the feed water had to pass through them to the boiler, resulted in an increase of 12 degrees in the feed temperature and a fuel saving of one percent or 10,000 cu. ft. of gas per day, amounting to $400 for the year. The actual cost of the work did not exceed $200. The wisdom of the investment is self-evident.

Attention has already been called to the waste of power resulting from throttling the suction gas before entering the compressors. The same remarks apply with equal force whether this throttling effect is produced by cramping a gate, using a regulator, or installing lines so small as to produce an equal pressure drop. Consequently it is necessary to so design the piping system that a proper balance will be struck between the cost of increasing pipe size and the power saved thereby through reduction in pressure drop. The importance of this applies to discharge lines as well as to suction lines, but not in the same degree.

In compressor station design and operation reliability of service should be the first consideration. For this reason ma-

chinery of ample power should be installed. Having done this, the next thought should be efficiency, and if any of the hints outlined in this paper help to secure it, the object in writing it will have been realized.

DISCUSSION.

After the generous applause which followed the reading of the above paper had subsided President Guffey said: "Gentlemen, I am sure the members of the Association join me in thanking Mr. Weymouth for his very instructive paper. The paper is now before you for discussion. To those who participate in the discussion I am going to ask you to come forward and stand on this small rostrum here so that whatever you may say can be easily heard throughout the hall. I will ask Mr. Edward D. Leland, superintendent of Compressing Stations, Philadelphia Gas Company, Pittsburg, Pennsylvania, to start the discussion. We all know his familiarity with the subject.

MR. EDWARD D. LELAND: Mr. President and gentlemen; Mr. Weymouth, out of the fullness of his experience has offered many suggestions of interest, not only to the power plant operating engineer, but also to gas engineers in general. In his account of a large gas engine station where the field pressure was reduced by regulators and then the station machinery made to compress the gas up to higher pressures again, he makes it very clear that installing engines of high thermal efficiency does not always result in the efficient operation of a gas compressing station. The case mentioned reminds me of a condition observed at a 2,000 H. P. station in West Virginia where, because the engines were without overload capacity, it was customary and necessary to throttle down the intake gas pressures in order to keep the machinery running. This reduced the delivery capacity of the compressors and wasted fuel in the performance of useless work. It was just another instance of high thermal efficiency but low station efficiency.

As the main purpose in building and operating gas compressing stations is to enable a company to get the gas to market, the true measure of efficiency is the successful accomplishment of

this purpose at a reasonable expense. Failure of a compressing station to give this result is lack of efficiency, whether such failure is due to poor machinery design, faulty compressor valves, boiler tube failures, cracked power cylinders or pistons, ignition troubles, hot bearings, failure of the lighting system or auxiliary machinery, fires or gas explosions, or simply to carelessness or incompetence on the part of the station crew.

I heartily agree with Mr. Weymouth in his idea that in the design and operation of compressing stations, reliability should be the first consideration. For as each day brings its own gas demand, the gas must be supplied the day it is wanted or the sale is lost. Therefore machinery that requires frequent shut down for adjustments, renewals or repairs is not suited to the needs of those companies whose gas is practically all handled by compressing stations.

I note Mr. Weymouth's success in obtaining better service from station employes by giving prizes for reliable running or for excellence of plant condition, and also by working out operating cost records on a horse power basis, and he is certainly right in his idea that increased efficiency in many operating details can only be brought about by the hearty co-operation of the station crew. But it is not always feasible to make actual comparisons between various stations, either as to cost of horse power developed, the cost of gas pumped, or the excellence of the general upkeep. For example, in the 22 stations operated by the company with which I am connected, there are installed condensing steam engines, two and four cycle gas engines. There is quite a difference in the sizes and number of units at the various plants and also in the intake and delivery gas pressures, as well as in the percentage of running time and in the load factors of the various engines. Also at some places we use coal for fuel and at others, gas. Therefore the different costs at the various stations per horse power hour developed is not always a fair indication of the comparative efficiency of operation. Our aim is to promote a spirit of emulation rather than a spirit of rivalry among our station engineers, and in order to do so we have encouraged the engineers to visit around among the other stations of the com-

pany.. Visits of this character have frequently been attended with the most pleasing results.

Mr. Weymouth is right in mentioning fuel economy as one of the features that deserve consideration, and it is very probable that efficiency of combustion is more important than either the mechanical or volumetric efficiency, often so eloquently emphasized by agents for compressing station machinery. The fact that most gas companies produce their own fuel, gives to the station fuel question many different angles.

Where the intake pressure is below atmosphere, if gas is used for station fuel it must be taken from the amount delivered by the compressors. In such a case, by substituting coal or oil, there might be saved the difference between the cost of the purchased fuel and the market price of the extra gas sold. Similar considerations might apply to the fuel for compressing stations used for relaying gas. On the other hand, where the intake pressures are above atmosphere and the gas for station fuel is taken from a common gas pool which is being drawn upon by competitors, the purchase of coal or fuel oil might prove simply an expense for which there would be no compensating return, because of inability to place on the market the extra gas not used.

If by efficiency in the operation of gas compressing stations we mean the effectiveness of the plant in proportion to the money spent, much would depend upon the amount of the original investment, and also the length of life of the station, as well as upon the operating and repair costs. For, while fuel, oil, and labor economies should receive due attention, the margin for saving in them is not very large where high grade machinery is properly installed and operated, and an expensive station which would be run but a few years might involve depreciation costs largely outweighing all possible operating economies. So we should not allow our interest in fuel economy to lead us into wasting either money, labor or material, for the conservation of these factors is as important as the conservation of any other resource.

I remember a station containing six 1,000 horse power engines which cost over $450,000.00 to build and which was abandoned after about four years operation.

Much depends upon the size and duration of the field and upon competitive conditions. I recall a station where several simple, non-condensing, slide valve engines were installed, while, in the same year, a competing company was erecting nearby a large Corliss cross-compound condensing engine. The simple engines were erected and in operation first and the field was practically exhausted before the larger and heavier engine was ready for service. In this instance the extreme plant depreciation resulted in a considerable loss to the one company in spite of their high class engine with its excellent thermal efficiency. On the other hand I know a Corliss engine plant that has been pumping gas almost continuously since 1904, has required very few repairs, and is still pumping a field that may last, at least, ten years longer. In this case the engine of higher thermal efficiency was unquestionably the wiser installation.

Not only are conditions different in the various gas fields, but each individual station also presents a problem of its own. We must consider the probable extent and duration of the field, prospective pressure conditions, possible overloads due to changing line conditions, the quality and condition of the gas, the peculiar hazards in connection with handling natural gas, and the various details that are inherent in gas compressing stations. All of these are in addition to the questions to be dealt with in the ordinary power plant.

It is quite evident that the design and construction of a gas compressing plant is not a problem that should be left to a machinery agent or power plant engineer. But in order to obtain real efficiency, which includes reasonable first cost, reliable service and economical operation, we should be governed by the advice and judgment of the practical natural gas engineer. (Applause).

President Guffey: We have with us this morning, Mr. John Glass, Chief Engineer, Carnegie Natural Gas Company, Waynesburg, Pennsylvania. We would be very much pleased to have Mr. Glass come forward if he will and give us the benefit of his experience and to discuss this very important subject.

Mr. John Glass: Mr. President and Gentlemen: I have

been very much interested in the paper and discussion of efficient operation of compressing stations, as for twenty years it has been my lot to build and operate gas compressing stations, and during all that time efficiency has been kept well in mind.

We built one 19 years ago, which is giving us excellent service today. All this time the station has only been out of commission 35 minutes, which caused a shortage of gas to the consumer. This is reliability.

This plant consists of a cross compound condensing engine with surface condensers. This plant has a fuel consumption of 20.5 cu. ft. of gas per horse power hour. It speaks pretty well of a plant built 19 years ago.

A great many here today will remember that at the Kansas City convention I referred to a series of tests of one of our plants consisting of two cross compound condensing Corliss engines using superheated steam with which a horse power was developed on 13.36 cu. ft. of gas, and while this result was pleasing our greatest object was to obtain reliable operation for we have to supply the Steel Mills with gas where any unexpected shut-down of the stations, and the consequent shut-down of a mill or cooling of a furnace is to them a very serious matter.

It may also be of interest to the members of the Association to know that during the six years of practically continuous operation of this plant, our repair, maintenance and operating costs have been so satisfactory to us that we have deemed it advisable to install additional plants of this type. These additional installations, however, were not made without first carefully considering the cost of other types of stations.

In our last installation we have also arranged to use coal instead of gas for fuel whenever such change would increase the efficiency of our plant. In our various installations there are many minor economies that have been worked out with the cooperation of our station engineers, and while these may be of interest to the station crew I do not feel that these items are of enough importance to warrant taking up the time of this Association in their discussion.

About offering a prize to the operating force — I have always been opposed to this method of getting results. If we

have a man that will not give us his best service after being educated to our requirements we look for another to take his place.

We started to build a gas compressing plant a year ago, which will be ready for operation in thirty days. We built to use coal as fuel, installing stokers and other appliances, but before we had gone very far with the construction coal advanced so in price, and you all know we have plenty of time to get the price of gas up, so it means to burn cheap gas until the price of coal drops. (Applause).

President Guffey: We would now like to hear from Mr. Charles Craft, Chief Engineer, East Ohio Gas Company, West Park, Ohio, if he is in the room. Is Mr. Craft present? (No response).

Is Mr. H. A. Quay, General Foreman, Manufacturers Light & Heat Company present? Is so, we would like to hear from him? (No response).

I will ask Mr. L. C. Frohrieb, Secretary Federal Engineering Company, Pittsburgh, to come forward and discuss this subject. I see he is present.

Mr. L. C. Frohrieb: Mr. President and Gentlemen of the Association: I do not think that the pioneers in gas compressing should be criticized too severely by Mr. Weymouth for installing simple slide valve engines at a time when it was customary to waste gas on every hand in enormous quantities as by burning flambeaus night and day, blowing wells continually in the air to astonish people by their roar, even setting fire to them for show purposes, selling gas on a contract basis per year at ridiculously low prices, regulating city pressure by wasting the surplus gas instead of shutting in the wells and numberless similar wasteful practices. Under these circumstances they should be commended for not wasting money as well as gas. Later however, as early as 1896, the installation of cross-compound condensing Corliss engines for compressors became good practice.

Referring to Mr. Weymouth's idea that the chief interest of gas company directors is the fuel cost per unit of gas pumped, I find myself unable to believe that this is their attitude, as I

have known many directors whose chief interest was the excessive repair cost of station machinery. Those directors who have the interest of their company at heart are chiefly concerned in the total cost of pumping gas and this includes interest and depreciation on original investment, operating costs, repairs and maintenance, loss due to shut-downs as well as fuel costs.

I do not entirely approve of Mr. Weymouth's arrangement for utilizing the exhaust from his gas engine for heating purposes, unless he has an emergency boiler and steam heating system available, for in case of a breakdown or shut down the station will become cold and danger of a freeze-up would exist on account of the water in the jackets and piping in the station, but the greatest danger would be while making repairs the operators would be tempted to use a gas fire to keep themselves warm enough to work if no other method of heating were available besides exhaust gases for heating. His proposed method of heating the station with the hot compressed discharge is so unsafe and at variance with good practice that it should not be used; instead of piping it around inside the station it should be piped outside as quickly as possible with a minimum number of fittings and joints. I do not see why Mr. Weymouth distinguishes between larger and smaller stations for this method of station heating unless he feels that when the probable trouble with it occurs he can spare the small station better than he could a large one.

The idea, however, of utilizing the waste heat of the boiler flue gases is an excellent one and is one of the many heat-saving devices that have been adapted and that have been the means of bringing the modern steam plant up to its present high efficiency.

Mr. Leland's reference to station efficiency being affected by faulty compressor valves reminds me of two stations which were out of commission practically all the winter on account of the failure of the compressor valves originally installed.

In designing gas compressing stations with the purpose of obtaining and maintaining efficient operation it must be borne in mind that the operating conditions are widely different from those occurring in the ordinary power plant where the necessity

of taking care of a peak load of short duration gives a reserve unit available each day which affords regular opportunity for a shut-down for adjustments and tuning up, while in the case of a gas compressing station it may be absolutely necessary for all the machinery to run steadily 24 hours a day for weeks and months at a time. (Applause).

PRESIDENT GUFFEY: We would be very much pleased to hear from any other gas engineer on the subject of "Efficiency in the Operation of Gas Compressing Stations" which we now have before us for discussion. The name of Mr. Ralph W. Hay, Assistant General Superintendent, Manufacturers Light and Heat Company, Pittsburgh, has been suggested. Is he present? (No response).

MR. T. R. WEYMOUTH: Mr. President, I would like to have the opportunity of making a few remarks.

PRESIDENT GUFFEY: Yes, Mr. Weymouth, we would be very glad to hear from you now.

MR. T. R. WEYMOUTH: Mr. President and Gentlemen: There were one or two points brought out that I would like to say an additional word about. With reference to Mr. Leland's statement that it is not always safe to compare the stations on a horse power hour basis I did not mean to imply in the paper that stations of different characters or even stations of different sizes, of the same character, should always be compared with each other. What I wish to bring out is the fact that these figures furnish a more equitable basis of comparison of operation of one particular station from month to month, and in many cases of comparison between stations of similar character and similar size. In other words it is much safer and more equitable to compare the operation of compressing stations on the horse power hour basis than upon the basis of the cost per unit of gas pumped.

I also wish to emphasize Mr. Leland's suggestion as to the encouragement of visiting the different stations by engineers. That is a matter which we have followed out for some years but which I neglected to mention in the paper. However, it is a most excellent idea and I coincide with what Mr. Leland has said on this subject. Mr. Leland is also right in saying that

each individual station must be designed and operated on its own feet, so to speak. That is, every individual case must be treated by itself, as no general rules can be laid down for the designing or even the operation of all compressing stations.

I am glad to have Mr. Glass's figures with reference to the economies in the operation of steam stations for they reveal a very excellent operating condition.

I would like to say with regard to the custom of offering prizes that we have found that all the men who work for us are very well pleased to receive proper recognition of the services and that is the idea we have in mind in offering these prizes.

With reference to Mr. Frohrieb's criticism of the method suggested in the paper for heating pumping stations I would say in 18 stations operated by our company every one of them is heated in this manner and have been heated for about six to eight years in the same fashion without once having been stopped by the troubles that he is anticipating. Undoubtedly he has in mind the operation of a station having a single unit upon which he imagines we depend for the heating, and in such cases it is possible to conceive of a condition where you would be without heat. In that case a small auxiliary boiler can be put in and as a matter of fact in one station we have been operating in this manner but we have never had to use the auxiliary boiler. Reliability and efficiency are the watchwords and the results we are striving for and there are many ways that this can be accomplished. I simply tried to outline the methods we have found most effective and most successful in our operations. I thank you. (Applause).

President Guffey: We would be very much pleased to hear from any other member of the Association who desires to add to this very interesting and valuable discussion we have had so far. Is there any further discussion of this subject of "Efficiency in the Operation of Gas Compressing Stations"? If not, we will pass on to the next paper which is entitled "Mixed Artificial and Natural Distribution in Cities" by Mr. A. B. Macbeth, General Manager, Southern California Gas Company. Mr. Macbeth was unable to be present but Mr. Shafer, General Superintendent, Southern California Gas Company, Los Angeles, California, is here and will read the paper for him.

Will you kindly come forward, Mr. Shafer?

MR. SHAFER: Mr. President and Gentlemen of the Convention, I hope you will be generous enough to excuse me in appearing before you in my overcoat. Yesterday afternoon I saw the ice floes at Niagara and my teeth have been chattering ever since.

Mr. Shafer then read for Mr. Macbeth the following paper:

MIXED ARTIFICIAL AND NATURAL DISTRIBUTION IN CITIES.

By Alexander B. Macbeth.

The problems arising out of the introduction of natural gas into Los Angeles and vicinity are so different from those in eastern cities, that it is necessary that I first explain what the gas situation is in our city of sunshine.

The city of Los Angeles has a population of 556,000, and is surrounded by many smaller municipalities having a combined population of 194,000.

The Midway Gas Company, which is a production and pipe-line company, delivers natural gas to Los Angeles through two lines, one twelve-inch line entering the city from the north, from Taft in Kern county, California, is 111 miles long, with a delivery capacity of about 20,000,000 cubic feet per day; and one eight-inch line, coming into the city from the south, supplies gas from the so-called Whittier-Fullerton field, twenty miles south-

east of Los Angeles, and has a capacity of 10,000,000 cubic feet per day.

All gas delivered by the Midway Gas Company is delivered to the Los Angeles Gas & Electric Corporation having 135,000 consumers, and the Southern California Gas Company which has 28,000 consumers of its own and supplies other companies having 27,000 consumers. The Los Angeles Gas & Electric corporation distributes a mixed gas containing 50% natural gas. The Southern California Gas Company which is under the same management as the Midway Gas Company (the natural gas company) supplies all of its consumers in the city of Los Angeles with a mixture containing 50% natural gas, and to the remainder of its consumers some straight natural and some mixed gas, and in like manner, distributes to some of the companies it supplies straight natural gas, and to others a mixture of artificial and natural gas in proportions of fifty percent and these companies in turn distribute to their customers the gas supplied by the Southern California Gas Co.

The maximum combined daily sendout of gas of all characters to supply these 190,000 consumers, in the winter of 1916-17 was 36,535,000.

The climate of Los Angeles is very different from that of almost any other city in the United States. The temperature seldom drops below forty degrees. The days are warm in the winter time and the nights are cool in the summer and the amount of fuel required for domestic use for heating purposes is very small.

Very little gas is used for illuminating purposes, electricity supplied from hydro-electric plants being sold at very low rates, and gas for lighting has never been pushed. Gas is universally used for cooking and heating water in residences, but in hotels, apartments and large buildings, distillate, purchased at a very low price, is used to a large extent. While the amount of gas used in furnaces has increased somewhat since the introduction of high heat unit gas, a large amount of domestic heating is still done with distillate, coal, wood, carbon briquets which are the competing fuels.

The natural gas supplied by the Midway Gas Company is for the most part of two kinds. Below please note chemical analysis, gravity, and heat values, first of the natural gas from the Kern County Fields and then of that from the Whittier-Fullerton Fields:

Kern County Fields Gas	
CO_2	5.0%
111	0.4
O	0
CO	0
C_2H_6	14.9
CH_4	79.0
N	0.7

Spec. Gr. .72 1120 BTU's

Whittier-Fullerton Fields Gas	
CO_2	0%
O	0.4
CH_4	84.0
C_2H_6	15.6

Spec. Gr. .678 1208 BTU's

Also note below the analysis of the artificial gas formerly distributed in Los Angeles before the introduction of natural gas, being an oil gas made by the single cylinder process.

CO_2	0.5
111	4.1
O	0.2
CO	8.1
H_2	46.4
CH_4	37.6
N	3.1

Spec. Gr. .549 674 BTU's

also an analysis of the artificial gas which at the present time is being mixed with the natural gas being distributed:

CO_2	4.6
111	.6
O	.7
CO	13.6
H_2	53.2
CH_4	26.1
N	1.6

Spec. Gr. .44 535 BTU's

Natural gas was first introduced and a mixed gas furnished to domestic consumers in Los Angeles in the latter part of 1913. At that time, varying mixtures were furnished to consumers, but for the most part this mixture varied from 15% to 45% of natural gas.

In the early part of 1914, straight artificial gas was again furnished and continued until the first of August, 1914, at which time the companies commenced to distribute a mixture consisting of 50% natural and 50% artificial gas, which has practically been maintained since that time. This change from artificial gas to gases containing varying amounts of natural gas, up to 50% was done without any inconvenience or complaint from consumers whatever.

On account of the limited amount of natural gas to be obtained it has been deemed best to continue the fifty-fifty mixture up to this time and to sell the surplus gas for industrial purposes. This may be changed by the State Railroad Commission which now has the matter under advisement.

It is most interesting to study the effect on the consumption of gas caused by the increase in heat units in the gas being distributed and for this purpose I draw to your attention Table 1 and Chart "A". This table and chart show that the increase in BTU content of the gas has resulted in a decrease in volume or consumption almost in proportion to the increase in the heating value of the gas: that in the beginning the demand of the average consumer expressed in heat units, was practically constant and that when gas of high heating value is supplied less will be required than when the consumer is furnished with gas of low heating value; that since the introduction of natural gas mixed with the manufactured gas, the BTU consumption has increased slightly, due to the fact that the gas has been put to some new uses.

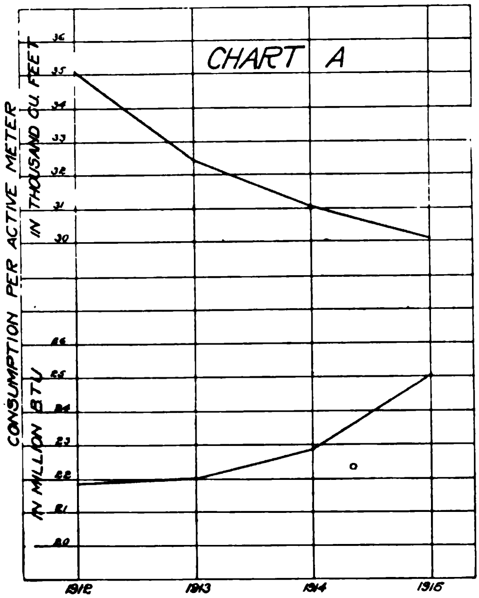
TABLE 1.

CONSUMPTION PER ACTIVE METER PER YEAR.

Years.		*Cubic Feet.*	*B. T. U.*
1912	....	35,022	21,844,000
1913	....	32,466	21,995,000
1914	....	31,068	22,867,000
1915	....	30,959	25,092,000

FOR MONTHS OF JUNE, 1914 AND JUNE, 1915 IN CUBIC FEET AND B. T. U'S.

	1914.	*1915.*
June cu. ft....................................	2795	2183
June B. T. U..................................	1,740,285	1,773,000



Comparing the year 1915 with the year 1912 there has been a reduction in the rate of 15% and an increase in the BTU content of the gas of 30% resulting in each consumer receiving 53% more heat per dollar in 1915 than he received in 1912. This decrease in rate has been accomplished by an increase in BTU consumption of only 15%. The table also shows the con-

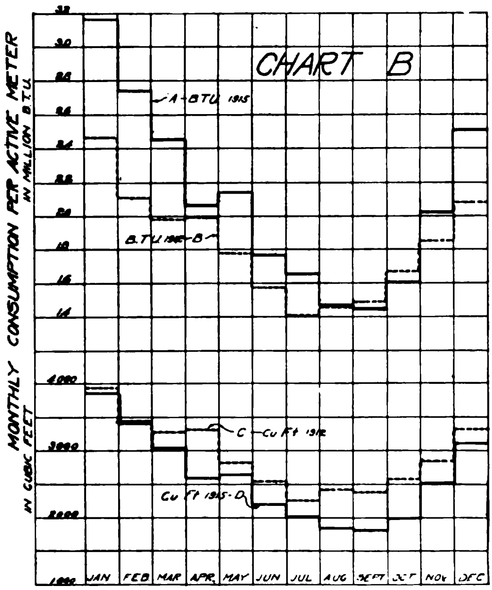
sumption in cubic feet and BTU's for the month of June, 1914, compared with the month of June, 1915. During 1914 we were distributing unmixed artificial gas and in 1915 we were distributing a mixture of 50% natural and 50% artificial. The results are very striking.

As a further comparison of the effect of the increase in these heat units, I call your attention to Table 2 Chart "B" showing the monthly consumption per meter in cubic feet and in BTU's for the years 1912 and 1915. This table and chart also show that the consumption in the month of September which is usually the month of the lowest consumption is in the year 1915 about 46% of the consumption in the month of January, whereas in eastern cities in the month of August which is the month of low consumption it is only 17% of the January consumption.

TABLE 2.

COMPARATIVE CONSUMPTION PER ACTIVE METER IN CUBIC FEET AND BRITISH THERMAL UNITS — YEARS 1912 AND 1915. CITY OF LOS ANGELES.

Month.	1912. Mfg. Gas Cu. Ft.	1912. B. T. U.	1915. Mixed Gas Cu. Ft.	1915. B. T. U.
January	3935	2,463,000	3847	3,175,000
February	3408	2,105,000	3129	2,738,000
March	3278	1,978,000	3036	2,453,000
April	3307	1,778,000	2591	2,073,000
May	2811	1,574,000	2649	2,151,000
June	2522	1,408,000	2183	1,773,000
July	2253	1,477,000	2001	1,650,000
August	2406	1,485,000	1820	1,479,000
September	2380	1,662,000	1781	1,454,000
October	2578	1,839,000	1998	1,604,000
November	2812	2,081,000	2512	2,030,000
December	3302	1,994,000	3109	2,512,000
Total	35022	21,844,000	30959	25,092 000



The rates charged in the city of Los Angeles have been as follows:

Just previous to July, 1911	80 cents
July, 1911, to July, 1912	75 cents
July, 1912, to July, 1913	70 cents
July, 1913, to date	68 cents

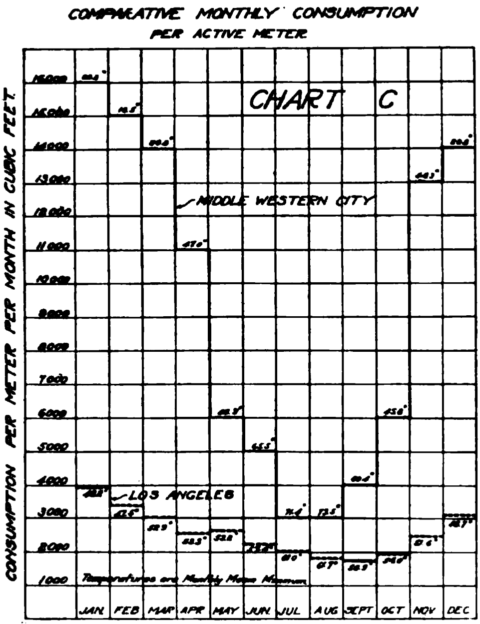
The reason for comparing 1912 to 1915 is that 1912 was the last full year that straight artificial gas was supplied, and 1915 was the first full year that the mixture of 50% natural and 50% artificial gas was served.

I now call your attention to Table 3 and Chart "C" which show the consumption per active meter in a middle western city and in Los Angeles, together with the monthly mean atmospheric temperature for these two cities. The monthly mean minimum temperature means, of course the average of the minimum temperature each day.

TABLE 3.

COMPARATIVE MONTHLY MEAN MINIMUM ATMOSPHERIC TEMPERATURES AND GAS CONSUMPTION PER ACTIVE METER — MIDDLE WESTERN CITY AND CITY OF LOS ANGELES.

	Consumption Per Month Per Active Meter.		Monthly Mean Minimum Atmospheric Temperatures.	
	Middle Western City.	Los Angeles.	Middle Western City.	Los Angeles.
January	16,000	3,175	20.8° F.	48.2° F.
February	15,600	2,738	18.5	47.5
March	14,000	2,453	29.8	52.9
April	11,000	2,073	47.0	53.3
May	6,000	2,151	58.2	53.2
June	5,000	1,773	65.5	57.4
July	3,000	1,650	71.4	61.0
August	3,000	1,479	73.5	61.7
September	4,000	1,454	60.4	58.9
October	6,000	1,604	45.8	54.0
November	13,000	2,030	44.3	51.6
December	14,000	2,512	29.8	48.7
	110,000	25,092		



This chart, I think, shows graphically how the gas requirements in Los Angeles vary from those found in eastern cities.

Now, as to the effect on the consumer of changing the quality of gas which he received from time to time in order to piece out the natural gas supply with artificial gas.

From time to time, since natural gas first came to Los Angeles we have been compelled in certain districts in order to maintain pressure during an emergency to turn into a district ordinarily supplied with a mixture of 50% natural and 50% artificial gas, an unmixed natural gas. The result of this during the winter of 1915-16 was not attended by any serious complaint from consumers. At that time our natural gas had a heating value of 1,120 BTU's and was gas received from Kern County Fields, an analysis of which is shown above.

During the years 1916-1917, however, the Southern California Gas Company obtained almost its entire supply of natural gas from the Whittier-Fullerton Field which gas had a

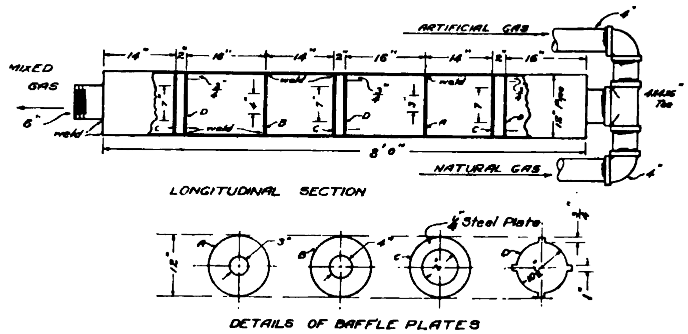
heating value of 1,200 BTU's at that time, and when we attempted to turn this natural gas in to maintain the supply in a district formerly supplied with mixed gas, we did have considerable complaint. When this was done, it meant that a considerable part of the district for several hours of the day was supplied with natural gas of about 1,200 BTU's and the remaining part of the day was supplied with mixed gas varying from 800 BTU's up, and the quality of gas was changed while the consumer was in the process of cooking meals. The nature of those complaints seems to have been when natural gas was on the district, of smoke and lamp black on the cooking utensils. When mixed gas was turned on the district, quite often the consumer complained of poor pressure, when as a matter of fact, the pressure was the same and the real cause was the reduction in the heating value.

During the year 1914, unmixed manufactured gas was substituted from time to time in some districts where straight natural gas had previously been served, and in other districts where a mixed gas had been served. It was found, that where pressures were maintained and the heat value of the manufactured gas was not allowed to go below 625 BTU's comparatively few complaints were received from the consumers, in spite of the fact that in some districts nothing but natural gas had previously been served.

We have found that where a stove is adjusted for mixed gas of 800 BTU's, and artificial gas of less than 550 BTU's is supplied that the stove will flash back and light in the mixers.

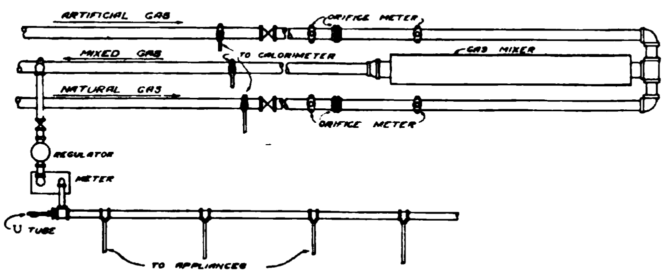
In order to determine the effect on consumers' appliances of different mixtures of artificial and natural gas we conducted a set of experiments, a brief description of which follows:

It was first necessary for us to be able to uniformly mix with our natural gas varying proportions of artificial gas, and to be able to maintain these mixtures during the experiments. For this purpose, we designed a mixing chamber consisting of a 12-inch pipe with baffler plate throughout its length. This is shown in drawing following, marked "Fig. 1." "Fig. 2" shows how this mixer was connected up with the natural and artificial gas lines, gauges, gas appliances, etc.



DETAILS OF GAS MIXER

FIGURE 1



GENERAL LAYOUT OF MIXING APPARATUS

FIGURE 2

The natural gas being passed into this mixture was received direct from the high pressure natural gas mains, and the artificial gas was compressed up to a pressure of about 35 pounds and the two gases after passing through the mixer were turned into the city mains.

The amount of gas being passed through the mixer was approximately 25,000 cu. ft. per hour. This mixer was also tested out passing 18,000 up to 30,000 cu. ft. per hour, and on pressures varying from 5 pounds to 40 pounds, and it seemed to mix the gas perfectly.

The meters used to measure the artificial and natural gas in the mixture were of the orifice type, which we use almost entirely for measuring high pressure gas throughout our system, and which we find to be most satisfactory.

In order to prove the effectiveness of our apparatus as designed for mixing natural and artificial gas, the heat units of the two gases being mixed were first determined, and then several tests were run on the gas after it was mixed in different proportions, and in each case the heat units obtained from the mixed gas corresponded to the heat units of its component parts. This is shown in Table 4.

TABLE 4.

Test No.	Art. Per Cent.	Nat. Per Cent.	B. T. U.		Error of Comp. B. T. U.	S. P. Gravity.		Error of Comp.
			Comp.	Cal.		Comp.	Machine.	
1	56.3	43.7	788	810	2.8 less	......	......	
2	51.6	48.4	823	826	0.3 less	......	......	
3	79.2	20.8	592	597	0.8 less	......	......	
4	67.5	32.5	669	678	1.3 less	......	......	
5	59.8	40.2	767	808	5.3 less	.542	.540	.03 of 1 hi.
6	45.4	54.6	874	899	2.8 less	.575	.567	1.3 higher.

All tests were made with Hinman-Junkers calori-meters and the heat units reported are the gross heat units. Fig. 3 is a

photograph showing the mixer, pipe systems, gauges, appliances, etc., used in the experiment and Fig. 4 is a side view showing in more detail the appliances used, including the arc lamps.

The top burners of all the ranges used and two of the oven burners are shown in Fig. 5. Each top burner had an adjustable air shutter and an adjustable gas orifice. The oven burners of these ranges were made of cast iron with drilled holes. They differed only in the arrangement and in the location of the holes.

The oven burner for No. 1 range extended from side to side under the center of the oven. A row of holes was drilled along each side at an angle of 45 degrees upward; this is the upper oven burner in the illustration.

On range No. 2 the oven burner extended from front to rear along the centre of the oven: it had a row of holes on each side at an angle of 45 degrees upward.

No. 3 had a burner along each side under the oven extending from front to rear. Each burner had one row of holes drilled so that the flame would be thrown toward the centre at an angle of about 45 degrees upward.

No. 4 had an oven burner in the form of two cast iron pipes one behind the other. Both had a row of holes drilled on each side so that the flame pointed 45 degrees downward.

Burners No. 5 and 6 were for the same range, the oven burners for this range were in the form of two cast iron pipes, one behind the other, each with two rows of holes pointed 45 degrees upward.

The burners for the water heaters are shown in Fig. 6. No. 1 had an adjustable mixer but no adjustable gas orifice. The others had both an adjustable air mixer and an adjustable gas orifice.

The Armour furnace burner which is of local design has an adjustable air shutter. It also has a very large mixing chamber. The burner of the other furnace shown in picture is a ring about 18 inches in diameter made of ½" pipe; the holes are drilled on the inside. It has an adjustable air shutter but no adjustable gas orifice, and is a very cheap affair.

The Hawks radiator has an adjustable air shutter and an

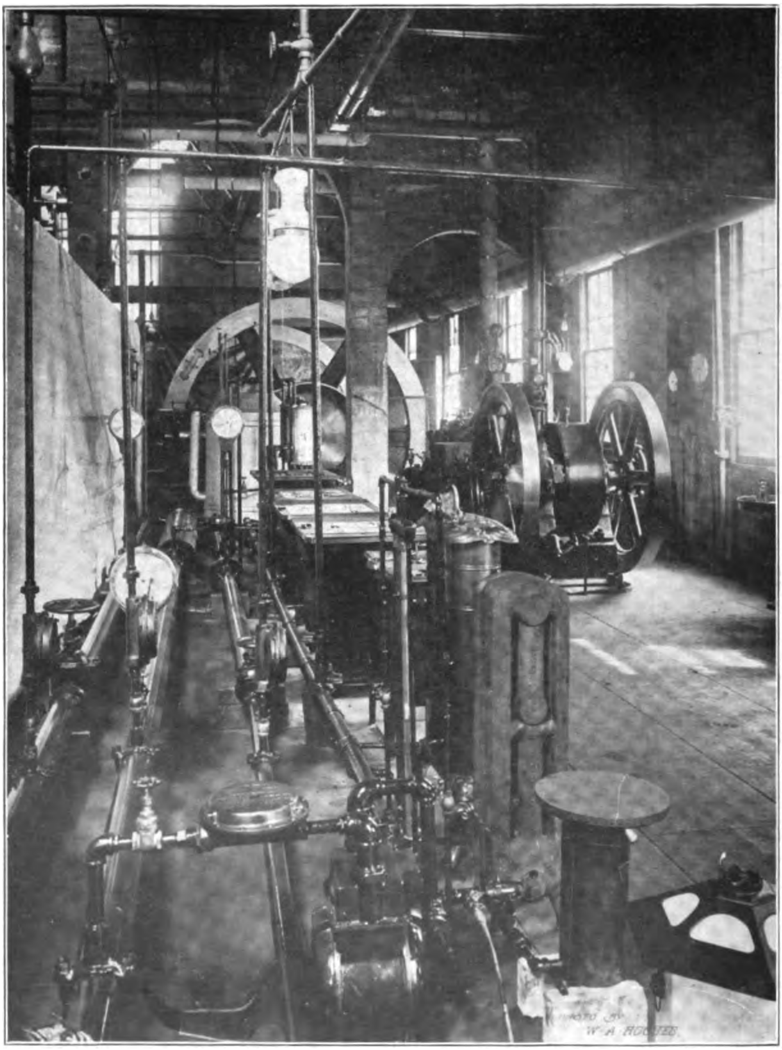


FIG. III. — Mixer and Pipe System.

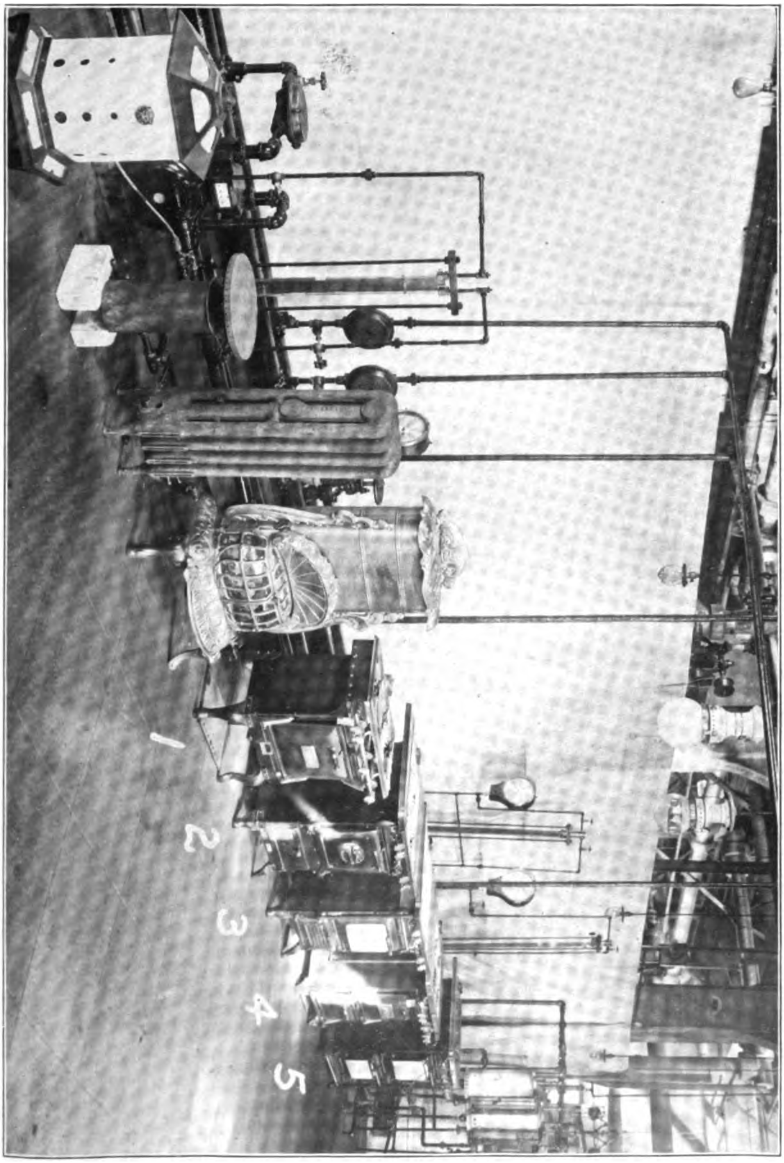


Fig. IV. — View of Appliances.

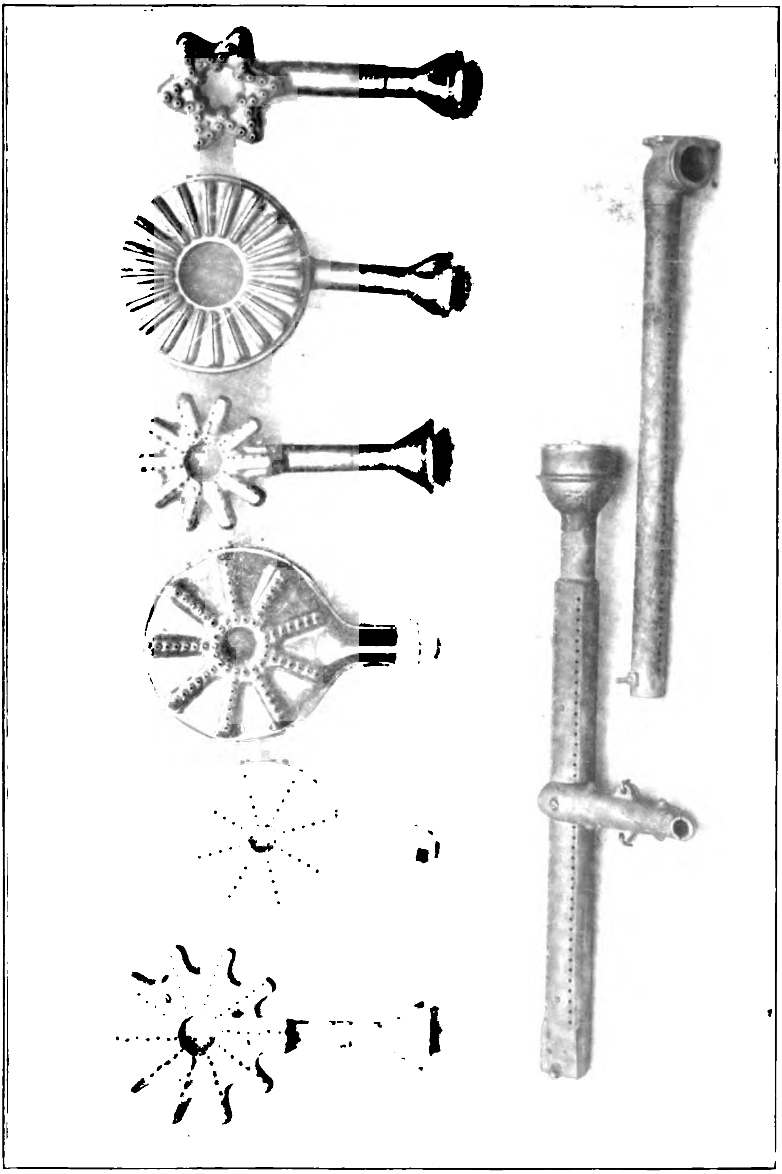


Fig. V.—Top Range Burners and Two Oven Burners.

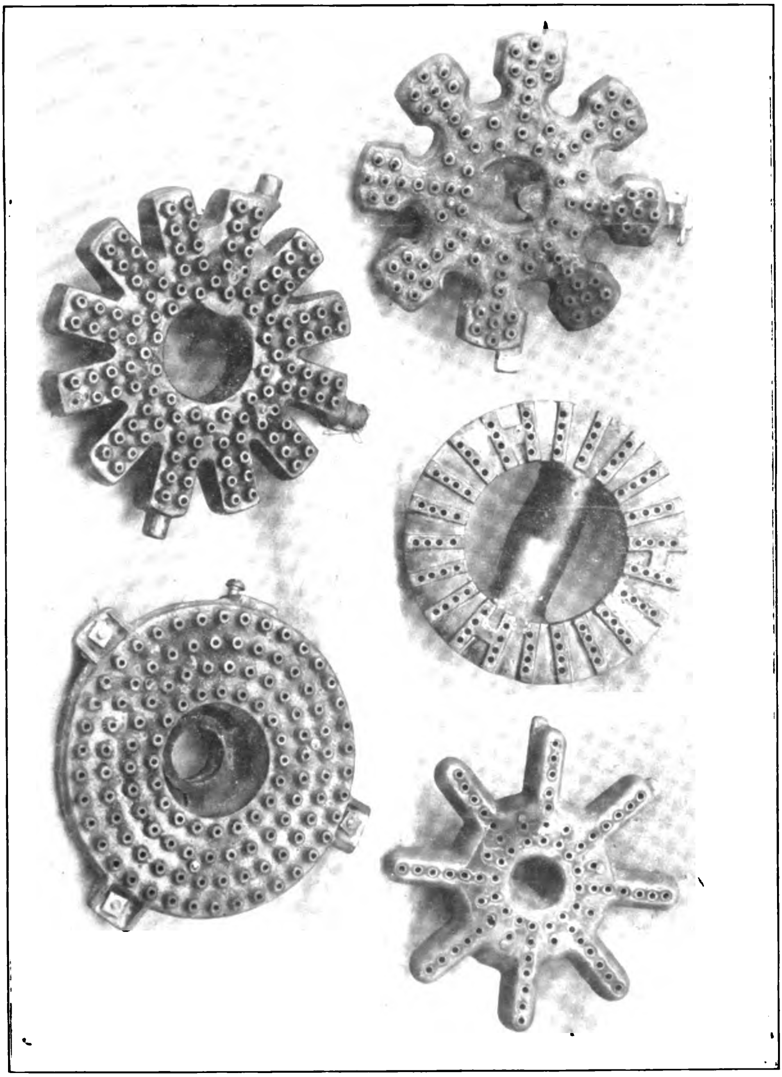


FIG. VI.—Burners for Water Heaters.

adjustable gas orifice. The burner is a cast iron pipe with holes drilled in the upper side. The Detroit Jewel Heater has a double burner made of cast iron, with holes drilled in the upper side. Balls of fire clay about 3" in diameter are laid above the burners. These act as bafflers and also retain the heat as well as aid combustion.

The lights used were three mantle Humphrey and a four-mantle Welsbach, both indoor arcs.

The tests on the above mentioned appliances were run for three different conditions as follows:

First: The burners of all appliances were adjusted for a mixture of

Artificial gas	50%
Natural gas	50%

The gas used was artificial of 674 BTU's and natural of 1,208 BTU's. The mixture was gradually changed by adding more of either gas. The object was to find how much the mixture could be changed before it was noted in the combustion.

An observer was stationed to watch each burner and report the first change of flame. These observers were reliable men representing three gas companies. As artificial gas was added, the first change in flame was noted at 70% artificial gas and 30% natural. This was for top burners No. 2 and No. 3. These, we might state, are not sold by gas appliance companies but are sold by furniture companies when they furnish a house complete for $98.00. These burners are pressed sheet iron and have not sufficient open space on the inside.

When a mixture of 80% artificial and 20% natural was reached, all observers had noted a change in flame.

When the natural gas was increased, the first change was noted at about 68% natural and 32% artificial. In other words, it takes a change of from 18% to 30% either way in the mixture before it can be noticed in combustion rather than a larger or smaller flame. The effect of a change in mixture will be taken up in other tests.

Second: The burners on all appliances were adjusted for a 50% artificial and 50% natural gas mixture. The gas was then

changed to a mixture of 0-10-20-30-75-90-100% artificial and the effect of these changes of mixture was noted on the combustion of the different burners. The gas used was artificial 674 BTU's. Under this condition good combustion was obtained from all burners except the cheap one, which had a slightly yellow flame, and No. 1 water heater which had an orifice for artificial gas that was a little too large for this mixture.

The mixture was then changed to

Artificial	75%
Natural	25%

All burners burned with good but slightly reduced flame. The ring furnace burner mentioned above had a better flame than at the start. It is doubtless better flame than at the start. It is doubtless better for artificial gas. The No. 1 water heater also has a better but smaller flame than before.

The mixture was then changed to

Artificial	90%
Natural	10%

The above conditions applied but slightly more emphatic.

The next test was

Artificial	100%
Natural	0%

The burners were all burning with reduced flames. There was no tendency whatever to backfire. The flames were blue.

The mixture was then changed to

Artificial	25%
Natural	75%

In this practically all burners showed a higher flame than originally for the fifty-fifty mixture. However, it was a good active flame with considerable yellow and only a slight tendency to float.

The next was

Artificial	0%
Natural	100%

The flame was much higher, more yellow and had more tendency to float but no difficulty was experienced. By closing the valve, thus reducing the flame, one might say that all burned with a fairly good flame.

The lights used were both for artificial gas and could not be adjusted for natural. They burned well with artificial gas, the mantles were good and white, but with natural gas the mantles were good and white at the bottom only. These tests were carried on in an engine room and the vibration bothered the lights considerably.

Third: The burners on all appliances were adjusted for natural gas and the object was to note the effect on combustion as various percentages of artificial gas were added, and also to note the effect of a quick change to artificial gas of about 675 BTU's, also for 600 BTU's and for 540 BTU's. The natural gas was the above mentioned 1208 BTU gas.

With very few exceptions, the burners on all appliances were burning a good blue flame. These exceptions were the ring furnace burner and No. 1 water heater mentioned above, and top range burners Nos. 2 and 3. On these exceptions, the gas orifice could not be made sufficiently small for natural gas of this quality. While the combustion was good, it could have been improved upon, and did improve as artificial gas was added. The artificial gas used for the next two tests had 513 BTU's. With the burners all adjusted for natural gas as above, the mixture was then changed to

Artificial	11%
Natural	89%

This gave a gas of 1131 BTU's. The change in combustion was so slight that it could be detected only by very close observation. In general, the flame was slightly reduced.

The mixture was then changed to

Artificial	18%
Natural	82%

This gave a gas of 1082 BTU's. The flames were slightly decreased with less yellow, but all were burning well. The artificial

gas burners were burning slightly better and showed considerable improvement as more artificial gas was added.

The artificial gas was then changed to 674 BTU's, and the mixture was

Artificial	30%
Natural	70%

This gave a gas of 1048 BTU's. The flames all burned well but reduced to a greater degree.

The next test was

Artificial	52%
Natural	48%

This gave a gas of 929 BTU's. The result of this on the various appliances was in the same direction as the preceding, but more pronounced.

The next was

Artificial	75%
Natural	25%

This gave a gas of 722 BTU's, with similar results to the above. The flames all burned slightly lower.

The néxt was

Artificial	100%
Natural	0%

The burners were all burning 674 BTU's artificial gas. The stoves were all burning low, but otherwise good, and showed no tendency to backfire.

The next test was for

Natural gas	1200
Artificial gas	608

The aim was to see if burners set for natural gas of 1200 BTU's would backfire on 600 BTU gas. The burners were all set for straight natural gas and a quick change was made to artificial gas, but there was no backfire. The burners were then turned off and all would light without difficulty. When this same test

was made with 540 BTU's gas, there was a tendency in many of the burners to backfire, especially burners marked No. 2 and No. 3 in Fig. V, and many of the oven burners backfired with the mixture.

When we first began the introduction of natural gas, it was noticed that the admixture of natural gas with artificial materially increased the illuminating effect of the ordinary open flame burner, and in order to determine definitely what various proportions of natural gas would do to the illuminating power of the mixed gas when used in open flame burners, tests as per Table 5 were very carefully made in the following manner:

A five-foot Maryland meter prover was equipped with a double set of tin paddles revolving in opposite directions, somewhat in imitation of an egg-beater, for the purpose of thoroughly mixing the two gases. The required quantity of natural gas was accurately measured in the prover and the necessary amount of artificial gas was added to it.

To check all of the tests shown in the Table, the method of procedure was reversed, — that is, the artificial gas was first measured in the prover, and the natural gas followed. Heat units and candle power were taken for each variation of percentage of natural gas, and the BTU as well as the candle power is an average of the ten readings.

The candle power of the artificial gas at the time of these tests was 18.5 and that of the natural gas was 8.4 candles. It will be noticed that a general increase in illuminating power took place with the mixture of 5% natural up to the point when 35% natural was reached; thereafter a drop took place down to 70% natural. From 70% to 95% no tests for BTU were taken and the candle power determination was made rather difficult by reason of the streakiness and flickerings of the flame.

TABLE 5.

EFFECT OF MIXED GASES ON CANDLE POWER AND HEAT UNITS.

Percent of Artificial.	Percent of Natural.	Percent of Mixture.	Candle Power.	B. T. U's.
100	...	...	18.5	620
...	100	...	8.4	1055
95	5	100	19.1	631
90	10	100	19.7	658
85	15	100	20.2	685
80	20	100	21.0	701
75	25	100	21.1	724
70	30	100	21.2	753
65	35	100	21.5	768
60	40	100	21.0	791
55	45	100	20.0	809
50	50	100	19.3	839
45	55	100	18.2	861
40	60	100	17.7	878
35	65	100	17.3	904
30	70	100	16.4	917
25	75	100	15.3	No test for B. T. U's.
20	80	100	....	
15	85	100	14.1	
10	90	100	....	
5	95	100	13.0	
...	...	...	11.2	
...	...	...	9.1	

NOTE: I wish to state that I have been greatly assisted in preparing this paper by Mr. F. J. Schafer and Mr. B. G. Williams, who are responsible for most of the work done in connection with it.

DISCUSSION.

PRESIDENT GUFFEY: On behalf of the Association I desire to thank Mr. Shafer for so kindly reading Mr. Macbeth's most valuable and interesting production to our gas literature. I am sure the Association and all the members present as well as those who are going to have the pleasure of reading and profiting by the paper will join me in extending to Mr. Macbeth a vote of thanks for the able paper, presented to us through

Mr. Shafer. I would be very glad to entertain a motion to that effect now.

Mr. W. Y. Cartwright: Mr. President, I move a hearty vote of thanks be extended to Mr. A. B. Macbeth for preparing and to Mr. F. Shafer for reading the very valuable and interesting production to which we have just listened.

Mr. Martin B. Daly: I take great pleasure in seconding the above motion.

The above motion having been seconded, was unanimously adopted.

President Guffey: In the discussion of this paper this morning I am going to call on one of the youngest members of our Association who has only joined within the last month and who for the past four or five months has been giving considerable attention to this matter, having made a study of the situation for two of the natural gas companies in Western Pennsylvania. I want to introduce to you Mr. Warren S. Blauvelt, Consulting Engineer, Detroit, Michigan.

Mr. Warren S. Blauvelt: Mr. President and Gentlemen: This paper is one which seems to me cannot fail to interest every man who is engaged in the gas business, whether artificial or natural. Men engaged in the artificial gas business in many localities are very much interested in the possibility of having to solve the same problems which Mr. Macbeth has solved so satisfactorily at Los Angeles, and everyone engaged in the gas business is interested in the solution of a similar problem but from another angle. We all recognize that ultimately the natural gas supply will fail and that there will probably be a necessity for mixing artificial gas with natural gas extending over a period of a good many years until finally practically all the city services will have the artificial gas.

Mr. Macbeth tells of his results under conditions which were in many respects distinctly favorable. There are several district angles from which the problem can be considered. There is the technical problem; there is the commercial problem; there is the psychological and connected with that is the political problem. The last three problems should have been comparatively easy for Mr. Macbeth as it was his good fortune to be in the

position of improving the quality of the gas while reducing the price. As it will be impossible, so far as we can now see, to manufacture gas which can compete with natural gas, either in heating value or in price, it will be our problem to raise the price and reduce the heating value at the same time.

Mr. Macbeth's problem, it seems to me, was a little bit like the problem confronting the future endeavors of a certain colored man who was very much in love with a dusky maiden. I presume it would be proper to give her the name of Phoebe Snow while in Buffalo. He had been desirous for a long time of popping the question to her and after pondering over the matter for quite a while he screwed his courage up to the point of asking her. He says to himself "I am going to find out if Phoebe is going to take me." But he would look at her and she would look so beautiful and so far beyond anything to which he thought he could aspire that his courage would fail him and he would leave without having said a word about the subject that was uppermost in his mind. He got to thinking it over and thinking it over and finally he made up his mind that he could never pop the question to her in her presence, and so he thought he would try it over the telephone, and this was the conversation that is said to have taken place on his part: "Is this Miss Phoebe Snow? Well, I'm a young colored man of good habits. I don't drink and I have got a good job and I am getting fifteen dollars a week and save my money and I have bought a nice little cottage and it is all paid for and I have some chickens and I have two pigs and the cottage is all furnished and I have some money in bank. What I want to know is will you be my wife?" She is reported to have said: "Certainly, certainly, sure I will, but who am this that is talking?" (Laughter). The problem that others have to solve is not quite so simple as that which Mr. Macbeth has had to solve.

The most striking thing as we go over Mr. Macbeth's paper at the start is that with an increase of fifty-three per cent in the heat units supplied to the consumer for one dollar, there was an increased consumption of only 15 per cent. We all know that when the Tungsten lamp came in and replaced the carbon lamp, people generally demanded better lighting, but they con-

tinued to pay pretty nearly the same electric light bills and were glad to do so.

The very slight increase in the sale of heat units leads one to question whether at Los Angeles the gas market had been saturated before they improved the quality and reduced the price, whether the new business department eased up a little bit, whether the possibilities of industrial development in Los Angeles are very limited, or whether Los Angeles is very largely settled by Scotchmen. (Laughter).

You remember about the Scotchman who was riding along in the train and a neighbor alongside of him reached his hands in his pocket and drew out his pipe and tobacco pouch and said to the Scotchman, "Will you let me have a match" and the Scotchman handed him out the match. The chance acquaintance put the match on the window sill and felt in his pouch for his tobacco and he says "Why, I am all out of tobacco." The Scotchman leans over toward the window sill and says, "Then ye nae be needin' the match." (Renewed laughter). Possibly the gas consuming public of Los Angeles decided when they got the better gas they might just as well save the "match" at the same time and so did not increase their consumption as would ordinarily be expected.

Mr. Macbeth brings out very clearly the fact that there is no great difficulty in mixing various gases, and also—which is of very great importance—that there is a possibility of a very considerable variation in the calorific power of the mixture without causing the slightest inconvenience. In fact, it was impossible for any but the most highly trained observers to detect any difference whatsoever in the flame in the gas appliance when there was a change in the b. t. u.'s per cubic feet from 941 to 831 b. t. u.'s and so far as difficulties from flashing back or anything of that kind were concerned, there could be very much greater variations without any marked difficulty or inconvenience. From these results it would not be safe to assume that it is ever going to be possible to satisfy consumers if we permit excessive variations in the calorific value of the gas delivered. It is going to be one of the big problems of the future, as it has been in the past with artificial gas distribution, to keep the variations in

the quality of the gas delivered between very narrow limits. Wherever the problem of mixing gases comes in, the competent gas manager is going to try his best to keep the variations of heating power within reasonable limits and the success of the work will consist very largely in the ability to keep the variation within the narrowest limits.

There is one thing that Mr. Macbeth did not bring out which I think is well worthy of some consideration and that is the importance of maintaining a uniform pressure. Mr. Macbeth did call attention to the fact that when the B. t. u.'s went off people thought it was the pressure that went off. The converse of that is worthy of consideration and that brings up the question as to the effect which the maintenance of good pressure at the consumer's burner has upon the efficient utilization of the calorific power of the gas. Oftentimes very low pressures result in a greater waste of gas than a moderate reduction in the calorific power of that gas. If you maintain the pressure and have a slight reduction in calorific power you will have a better pleased customer than if you maintain the calorific power of the gas, but fail to maintain the pressure at the burner. There is no question that the Public Utilities Commissions will eventually insist upon the maintenance of reasonable standards of pressure regulation and it behooves all forward looking men in the industry to get ready for it and to "beat them to it." There is one feature, to anyone coming into the natural gas business from the artificial gas business, that is very impressive and that is the ridiculously low prices, from the artificial gas man's point of view, which natural gas men have been willing to accept for their product. This has unquestionably resulted in very great wastes of gas historians will denominate as almost criminal.

One of the things which was brought out in the paper that is very striking is the very slight seasonal variation in gas delivery at Los Angeles. In that land of sunshine there seems to be sunshine for the consumer, for the gas company, and for everybody else. Instead of having a variation as in eastern cities of from four to one or five to one, as in the case mentioned, there is a variation of something like two to one. There

is possibly still a great deal of work to be done in Los Angeles, in the way of increasing the summer load with industrial work, but the field for that is not nearly as great as it is in eastern cities. I believe that there is going to be a great deal of work done in the immediate future in the building of throw-over plants which will be operated probably with some kind of artificial gas in the winter time and with natural gas in the summer time, thus making it possible to utilize existing pipe lines and compressing stations at a higher average of efficiency throughout the year, equalizing the load and yet relieving the natural gas companies from the excessive winter peaks. I believe there are very few lines of work which look more promising. How this work will be done, whether the individual consumer will install local plants or whether the gas companies themselves will install local plants at points of distribution merely to carry the winter load and arrange for a definite charge for the winter load with artificial gas and then a rate for natural gas during the summer time, the future alone can determine; but something of that sort seems to be plainly indicated as the proper economic answer to the best utilization of an existing investment together with the most economical supply of fuel to these industries. Having once been educated to use gas and to appreciate its very great advantages, consumers hesitate a long while before they will go over to solid fuel with its many disadvantages. The industry as a whole is certainly very greatly indebted to the author of this paper and his assistant, Mr. Shafer, for having gone into the matter so much in detail and given us so much that will help all of us in the solution of these problems which confront some of us now and which are bound to confront everybody in the natural gas business sooner or later. I thank you (Applause).

President Guffey: We would like to hear from Mr. John H. Maxon, President and General Manager, The Central Indiana Gas Company, Muncie, Indiana. Mr. Maxon has had considerable experience in the artificial gas business. We would like for him to come forward if he will and discuss this all-important topic.

Mr. John H. Maxon: Mr. Chairman, I have attended a number of gas conventions recently and when men are unexpectedly called on I have heard them get up and say "I don't believe I can add anything to the interesting and valuable remarks which have already been made" and then launch out into an extended talk. I think probably it would be better to do what I will do right now and that is, when unexpectedly called on, to get up and say that I am interested in this important subject and I have something to say about it but I am going to be brief.

I have had the pleasure of going over this Los Angeles territory in its entirety and, therefore, this paper has been of especial interest to me. I want to call attention particularly to the fact that in that territory there is probably being collected more money per million b. t. u.'s for natural gas than any other place in this country. It appears that the 190,000 consumers in Los Angeles proper are paying about $21.00 per annum for about 31,000 feet of 800 b. t. u. gas which means 25,000,000 heat units and which brings 84 cents per million heat units. That is the Los Angeles operation. The interests I represent serve 42,000 consumers and thirty towns outside of Los Angeles and the service there is straight natural gas from both the Midway Company and the Whittier-Fullerton Field. The price per b. t. u. is about the same as for 800 b. t. u. gas. When the manufacture of oil gas was discontinued, the same prices were continued, namely, for the first 25,000 feet, about one dollar per thousand for about 1100 b. t. u. gas. Then the rate was dropped to 30 cents and so in both cases in that district the price per million b. t. u.'s is nearly the same.

The artificial gas business, serving about eight million consumers in the United States is delivering about 28,000 cubic feet per annum per consumer of 600 b. t. u. gas which means the delivery of about 17,000,000 b. t. u. gas per consumer per annum for $21.00 which means about $1.25 per million b. t. u.'s so you can see in the Los Angeles operation they are coming up nearer artificial gas practice per million b. t. u.'s. To bring out the comparison still further. it may be said in the State of

Ohio that there are 800,000 natural gas domestic consumers who are paying about 28 cents per million b. t. u.'s.

In regard to the mixing of gases it has been exceedingly interesting to hear what Mr. Blauvelt had to say. I will say that I have had some experience in a small way in that line of work and it has shown itself to be entirely practicable. I have operated one town for about two years with 700 b. t. u. gas made from about 40 percent natural gas and 60 percent blue water gas, with about one gallon of oil per thousand, making about 700 b. t. u. gas. The service has been eminently satisfactory and the rate averaged about 80 cents. Our company in Indiana has now practically perfected plans and will soon put into operation a mixed gas service in five towns with about 11,000 domestic consumers, where the use of 1100 b. t. u. gas is about 85,000 per annum per domestic consumer, with an average rate of 44 cents and an annual revenue of $37.30 per consumer. These same towns will receive service fifty-fifty. 1100 b. t. u. natural gas per 50 percent, and 50 percent 300 b. t. u. blue gas, making about 700 b. t. u. mixed gas, and the rate we expect to establish is $1.00 for the first thousand; 75 cents net for the next four thousand; 50 cents for the next 95,000, and 40 cents net for all over 100,000. We expect to sell 30,000 per annum of this 700 b. t. u. gas at an average of about 80 cents or $24.00 per annum per domestic consumer. I think that there are a great many places where natural gas may be in the future utilized as a component part of a very high grade manufactured or so-called artificial gas. I thank you. (Applause).

President Guffey: We would now like to hear from Mr. R. W. Gallagher, Assistant General Manager, The East Ohio Gas Company, Cleveland, Ohio, if he is present, as we know his familiarity with this subject.

Mr. R. W. Gallagher: Mr. Chairman, and Gentlemen: It is very nearly lunch time and I will be brief. Mr. Macbeth, Mr. Blauvelt and Mr. Maxon seem to have covered this situation very well, so that I haven't much to add. Mr. Blauvelt has gone into all the angles which will confront us in the future.

There is only one thing that I might suggest, if you will permit me to take your time for a few minutes only, and that

is the problems which arise in the distribution of gas. Most of us have a little different angle to contend with in the northern or central states where natural gas is being furnished than would arise, probably, in a territory located in southern California. That is, we do not have the regularity of temperature. The ordinary eight-room house in our district will use, when heating with gas, in the neighborhood of fifteen to eighteen hundred feet in twenty-four hours. Whereas, the increase in order to meet changed conditions of temperature from one day to another would be from three to four hundred feet, or even less, to the amount mentioned.

Unfortunately a great many of the gas plants in the Ohio and Pennsylvania districts were built when the towns were smaller than they now are and, as there was some question about the ability to procure large amounts of gas in the future, the gas companies not having confidence in the future of the natural gas supply, as well as the possibilities of the communities, used smaller pipe than should, as we now see it, have been used. I think we are all familiar with these conditions. The result is, we have built up a large heating business, saturating the business along the lines to the extent that we find on cold days we have considerable difficulty supplying through these lines sufficient natural gas of 1100 b. t. u.'s to heat the houses properly, even when we have all the gas necessary.

Now we come along to the point where we wish to put in gas lower in b. t. u.'s, and you must not forget that in doing so you have to carry more gas to that house to bring the same number of b. t. u.'s to your consumer. You should give this point serious consideration, as it is a problem which will have to be solved. Probably the only way that you can get away from this angle is to raise your prices to a point where you will cut out a great deal of that heating. And of course, as Mr. Blauvelt mentioned, when you start to raise your prices you have another serious angle confronting you. You are going to reduce your natural gas to a still lower b. t. u. gas which you are trying to sell for a higher price. Whereas, in the case of Mr. Macbeth, he was on the other side of the fence, selling a higher b. t. u. gas at practically the same price and giving the

people, consequently, better service. Now those are the two all-important questions.

I think you should be very much interested also in another question which comes to my mind in this connection. The gas which was supplied in southern California was probably an oil gas or a mixed gas with a gravity ranging around .45 to .50. Whereas, your probably requirements, considered from an operating standpoint in the districts where you have an abundance of coal, would be something in the nature of coke ovens, which will supply you with gas having a gravity of .35 to .37, and mixing this with your natural gas, has a gravity of .66. You will find that you cannot get the large percentages of mixed gas with a minimum of trouble in furnaces, that was worked out in the California case.

I do not want to trespass further on your time. I simply wanted to give you these suggestions to think about because I don't like to see you go away thinking that all you have to do is to take the gas and put it in your lines and you will have no trouble in the future. I thank you. (Applause).

President Guffey: We would be very much pleased to hear from any other member on this valuable and instructive paper by way of discussion or any other additional or further suggestions.

Mr. Francis P. Fisher: Mr. President, I would like to say a word.

President Guffey: Kindly come forward, if you will.

Mr. Francis P. Fisher: I will not take your time to come forward but I simply want to say that there have been some features of the subject of mixing natural gas and manufactured gas as referred to by the author of this paper that vary from the experiences we have had in Kansas. In the various Kansas gas fields it has unfortunately developed that the natural gas found is not nearly so uniform in chemical composition and heating value as the gas in most other producing Districts. The gas in different fields and even from different wells in the same field will have a wide variation of heating value. In some cases ranging from less than 100 b. t. u.'s per 1000 feet up to 1100 b. t. u.'s per 1000 feet in the same field but from different sands. The

question of utilization first became a commercial factor in 1914 when a field of this character, in which the gas ranged as low as 550 heat units, was turned into the main line where it mixed with gas which averaged about 950 heat units and causing various degrees of mixture to suddenly appear in the various cities furnished from the line. In extreme cases the gas went a little below 800 heat units but varied above and below an average of about 820.

The fact that the gas from the new field was below standard had never been suspected until complaints from consumers brought to light the fact that something was seriously wrong. A difference of a little more than 100 heat units had an effect on the combustion a great deal more serious than that experienced by Mr. Macbeth in the case which he referred to, varying from 600 to 1200 b. t. u.'s. It resulted in difficulties with burners and appliances and the consumers registered vigorous complaints and finally the controversy was thrown into the courts. It was taken from the Public Utilities Commission and there was more or less litigation extending over a period of two years out there. As nearly as I can see it the feature that was in Mr. Macbeth's favor as compared with the situation in Kansas is that this artificial gas, differing in its composition from natural gas; that is, containing appreciable quantities of carbon monoxide and olefins both of which are quick burning gases of high flame temperature and high rate of flame propagation but low in heat units. Thus in replacing a certain amount of natural gas with gas of this character, the result would be a quicker, hotter flame or a fire in which a very similar result would be obtained by burning a larger quantity of gas to that obtained from pure natural gas.

In the gas found in Kansas of lower heating value, this lower value is caused by the dilution of the natural gas with a certain amount of nitrogen. Natural gases are normally slow burning gases and the dilution with nitrogen tends to still further decrease the rate of flame propagation and make them slower burning than the natural gas so that the net result out there is that a difference of from 35 to 40 heat units, variation will be accompanied by a series of complaints from consumers who

encounter serious difficulties, whereas, Mr. Macbeth can get by with a variation of two to three hundred without any great inconvenience to the consumer. Therefore, I say this has become a commercial factor in Kansas and has brought about a movement which will eventually in that state, I believe, cause gas to be sold on the basis of heat units rather than by the cubic feet. This same difficulty may occur in other states and if so the quality of the mixture must be controlled with very narrow limits as suggested, for the burners and appliances are adjusted to natural gas of the kind we have previously been accustomed to employ and will not stand the wide variation in mixing natural gas with nitrogen dilution which from Mr. Macbeth's experience can be very safely used in mixed artificial gas. (Applause).

President Guffey: We would be glad to hear from any other member. Mr. Weymouth, your name has been suggested. Do you care to add anything to the discussion?

Mr. T. R. Weymouth: Mr. President, I think I have nothing further to add.

President Guffey: Does any other member wish to be heard? If not, we will proceed with the regular order of business. I will next call upon Mr. W. Re Brown, New Business Manager, Ohio Fuel Supply Company, of Columbus, Ohio, who will now make his report for the Wrinkle Department.

W. Re Brown,
Editor.

Alfred J. Diescher,
Assistant Editor.

WRINKLE DEPARTMENT.

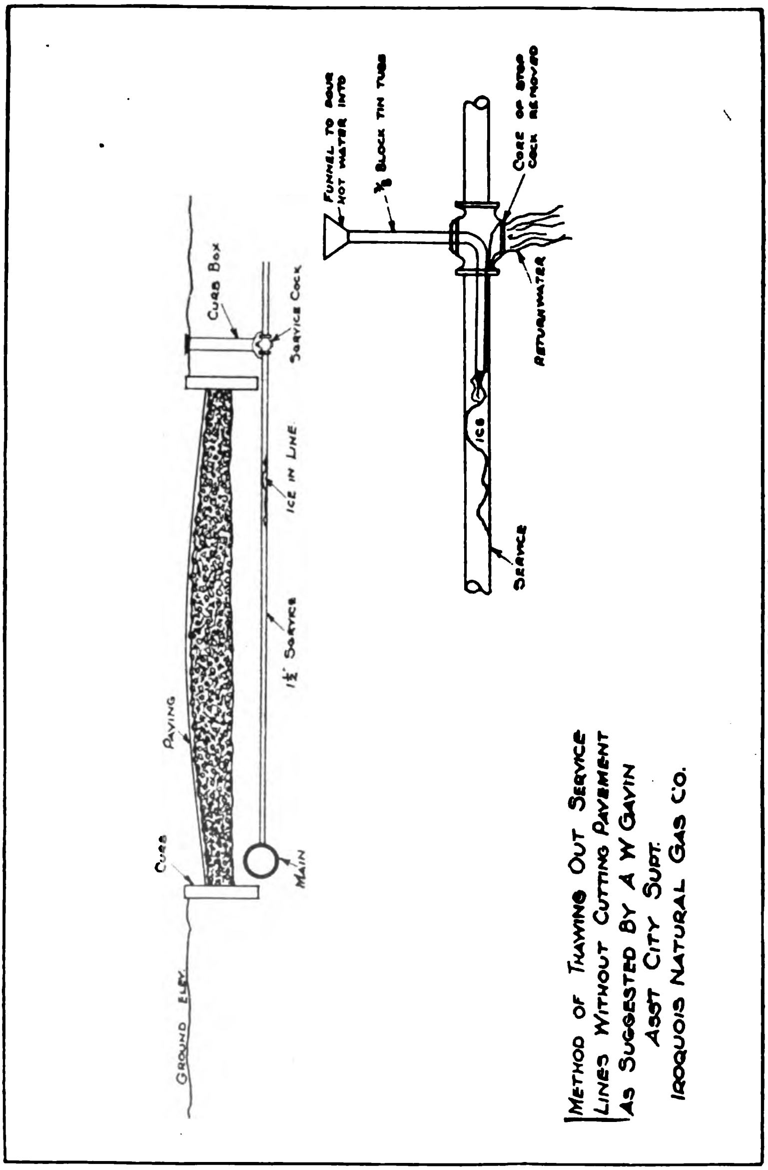
Wrinkle No. 1.

METHOD OF THAWING OUT SERVICE LINES WITHOUT CUTTING PAVEMENT.

A. W. GAVIN, ASSISTANT CITY SUPERINTENDENT, IROQUOIS NATURAL GAS CO., BUFFALO, N. Y.

The attached sketch suggests a method of thawing out a service pipe, frozen between stop-cock and main-line, without cutting piping or pavement.

This is done, as shown in sketch, by removing core of stop-cock, inserting ⅜″ block tin tube and applying water; the water is driven back through core of stop-cock by the pressure of gas as the thawing progresses.


Ground Elev.
Curb
Paving
Main
1¼" Service
Ice in Line
Service Cock
Curb Box
Funnel to pour hot water into
⅛ Block tin tube
Core of stop cock removed
Return water
Ice
Service
Method of Thawing Out Service Lines Without Cutting Pavement As Suggested By A W Gavin Asst City Supt. Iroquois Natural Gas Co.

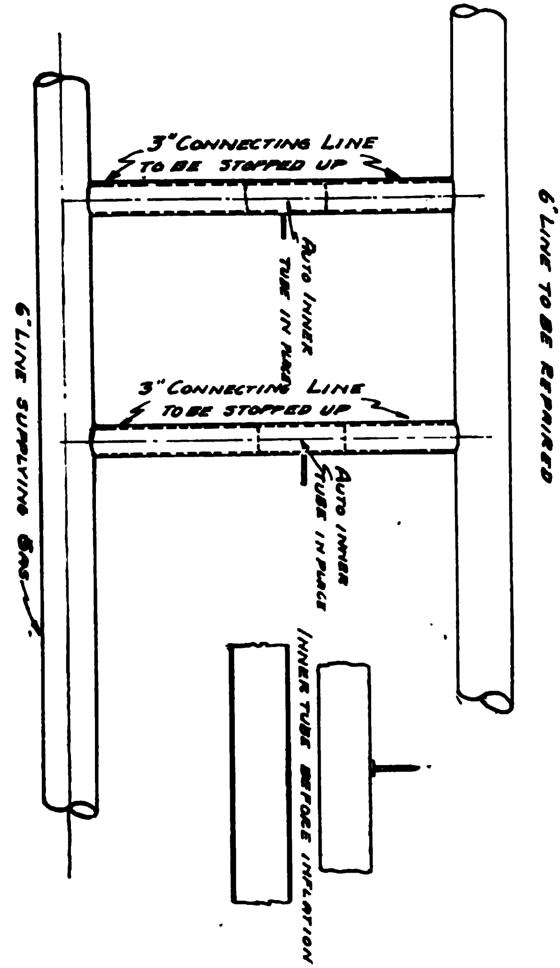
Wrinkle No. 1.

Wrinkle No. 2.

USE AUTOMOBILE TIRE INNER TUBE TO STOP FLOW OF GAS.

LON JORDAN, OKLAHOMA FUEL SUPPLY CO., CLAREMORE, OKLA.
W. W. BRUCE, SUPERINTENDENT OKLAHOMA FUEL SUPPLY CO., CHANDLER, OKLA.

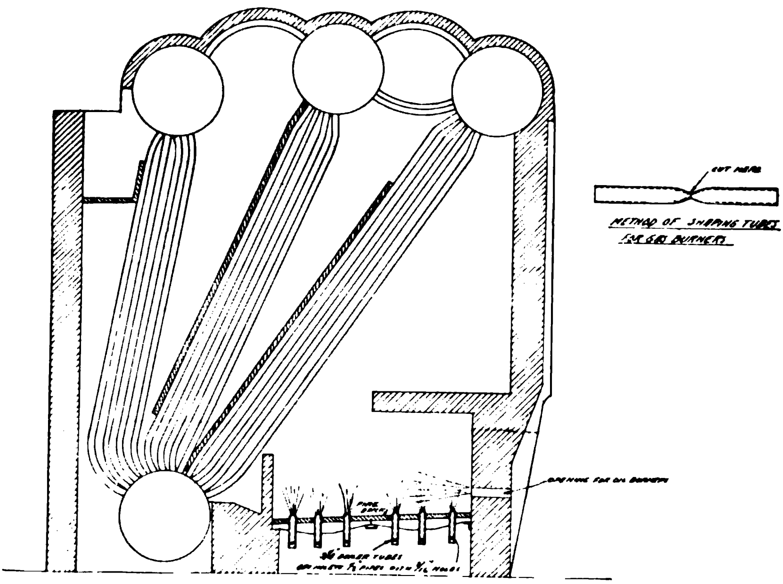
In repairing plant lines it frequently becomes necessary to cut out certain lines in order to repair others without inter-



Wrinkle No. 2.

fering with the general supply to any great extent. It recently became necessary for us to repair a certain six inch low pressure main, from which was connected two three inch lines, which in turn were connected and were being supplied from other distributing stations. In order to free the six inch line and continue service through the two three inch lines, a stopper was necessary to avoid cutting out the two lines and capping them temporarily. To do this we used for such stoppers the inner tube from an automobile. We had these cut to a length of about one foot, leaving the valve connection remain and had the ends vulcanized. By drilling a one-inch hole in the mains it was easy to make the insertion of the inner tube, after which lung pressure was sufficient to inflate them, the regular valve holding the pressure sufficient to accomplish the purpose. After repairs were completed it became a simple matter to withdraw the tubes and insert plug in the line.

I submit a drawing and feel that you will clearly grasp the simplicity of the operation. Of course this would not apply to large lines for the reason the tubes would not be procurable but serves for the conditions enumerated.



Wrinkle No. 3.

Wrinkle No. 3.

CONVERTING OIL BURNING STEAM BOILERS TO NATURAL GAS FUEL, OR VICE VERSA, WITHOUT DELAY OR AFFECTING STEAM PRESSURE.

J. T. CREIGHTON, SUPERINTENDENT GAS MANUFACTURE, LOS ANGELES GAS AND ELECTRIC CORPORATION, LOS ANGELES, CALIFORNIA.

The accompanying sketch illustrates a successful installation for making a quick change of fuel in steam boilers.

It will be noted that it is possible to use natural gas or oil for fuel — either independently or both at the same time, thus insuring a fire under boilers at all times. Old boiler tubes, swaged and cut, as per sketch, are used for burners. The roaring noise — an undesirable feature of burning natural gas under boilers — is entirely eliminated.

The complete installation costs approximately 50 cents per boiler horse-power.

Wrinkle No. 4.

COMBINATION GAS OR OIL BURNER.

GEO. HORSLEY, JR., THE EAST OHIO GAS CO., CLEVELAND, OHIO.

(See drawing on page 150.)

Wrinkle No. 5.

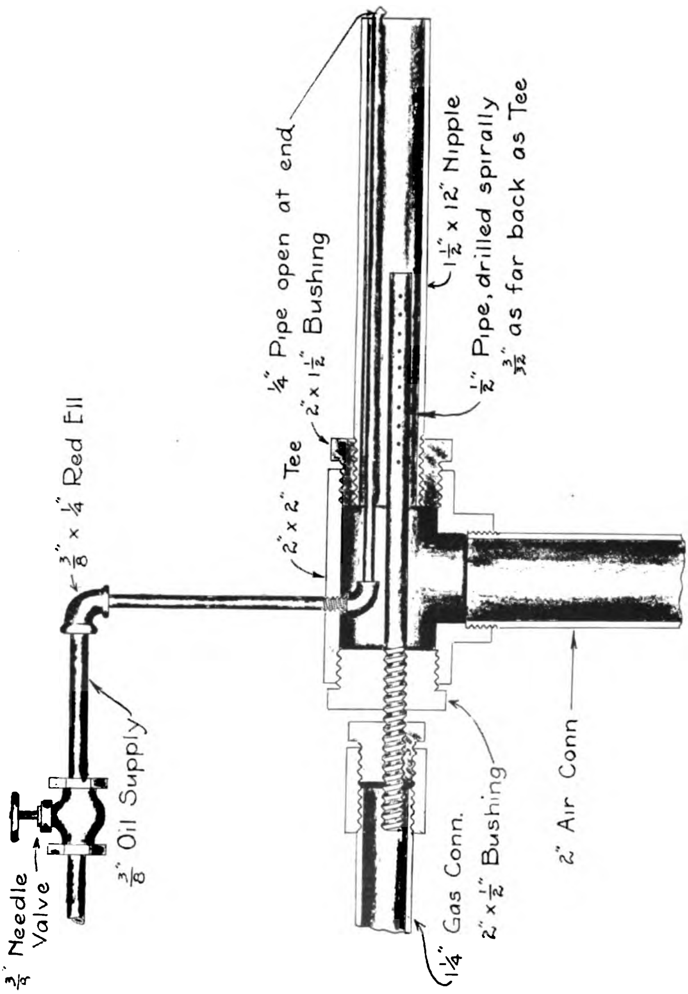
HORIZONTAL TUBULAR BOILER USED AS NATURAL GAS SEPARATOR.

W. H. SEDBERRY, MARSHALL GAS COMPANY, MARSHALL, TEXAS.

The accompanying sketch and photo of the installation of a horizontal tubular boiler placed in an upright position and used in an emergency by us as a separator with most excellent results.

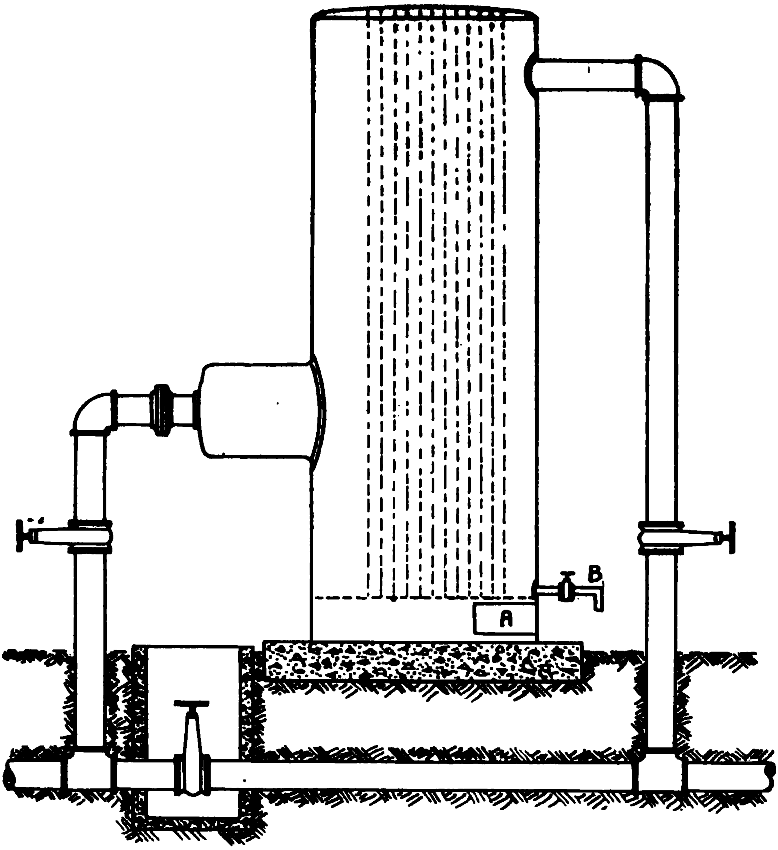
We were troubled with considerable oil and other matter getting into our low pressure lines this winter causing quite a lot of annoyance to our consumers. It was necessary to act quickly, and this 20 h. p. boiler being accessible, we immediately put our idea into operation.

You can readily see that by taking the gas into the side through the dome, it strikes the flues which act as baffles and passing between the flues finds an outlet at the top; there

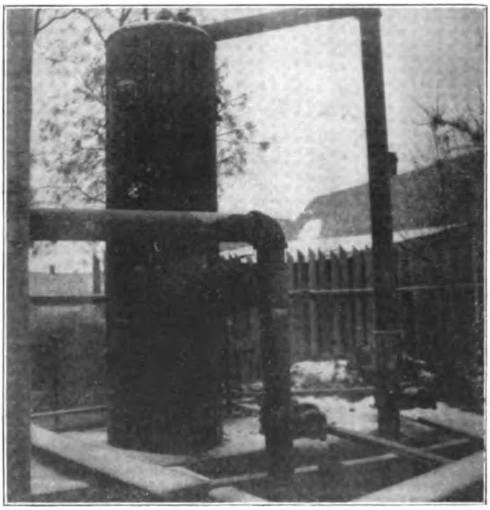


COMBINATION GAS-OIL BURNER

Wrinkle No. 4.



Wrinkle No. 5.



Wrinkle No. 5.

being an opening at the foundation creates a circulation of air through the flues which materially assists in condensation.

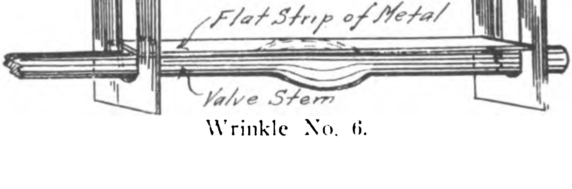
This condenser has now been in use for three months and since its installation we have had no more trouble with liquids or oil in our distributing system. A blow off is attached at B.

Wrinkle No. 6.

METHOD TO PREVENT PASSING OF UN-REGISTERED GAS BY TIPPING.

G. C. REED, TELEPHONE FOREMAN AND METER INSPECTOR, LONE STAR GAS COMPANY, FORT WORTH, TEXAS.

A flat strip of metal fastened from post to post will prevent valve from opening when meter is tipped, and meter will register accurately in any position.



Wrinkle No. 6.

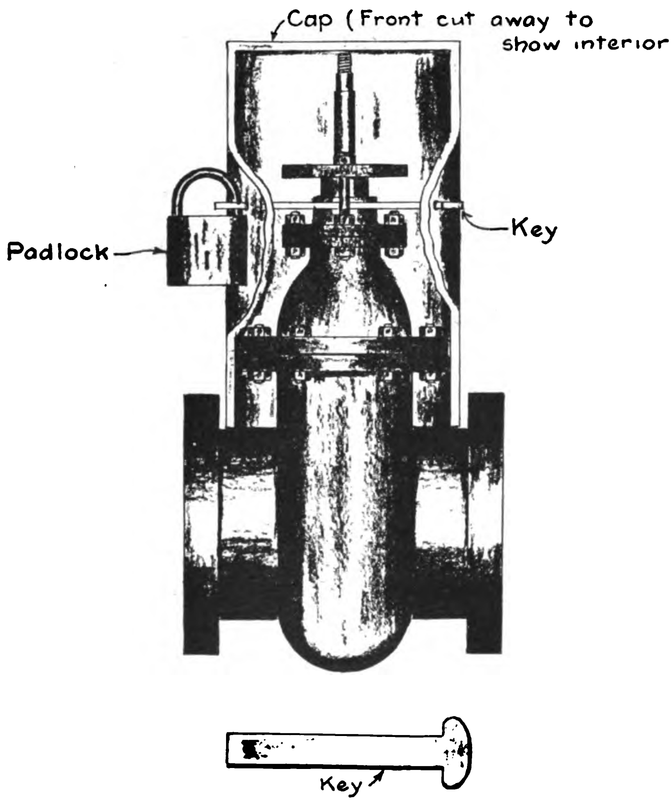
Wrinkle No. 7.

LOCK AND CAP FOR GATE VALVES.

W. G. HAGAN, THE EAST OHIO GAS COMPANY, CLEVELAND, OHIO.

This method prevents any tampering with valves.

This cap was used on an 8-inch gate valve and is made of 6″ pipe with a cover welded on top. Slots are cut in the sides



Wrinkle No. 7.

to permit the key to extend through and between stuffing box and bolt. The key is made with a "T" head and has a hole at the other end to allow the ring of the pad-lock to pass through.

Wrinkle No. 8.

TO PREVENT LONG MAPS FROM TRAILING ON THE FLOOR.

THE EAST OHIO GAS COMPANY, CLEVELAND, OHIO.

Some very large maps, more than twelve feet long, made some arrangement necessary that would roll them up at the bottom to keep them off the floor, when a view of the top of the map was desired.

The maps are arranged on the tin spring map rollers in the usual manner in the nest up at the ceiling. At the bottom of the map, we used a split cork pine cellar 2¼″ in diameter. In the left end of the roller, a pin is driven of ¼″ diameter. This pin enters a hole in the brass bracket at the left end of the roller. This bracket is securely fastened to the wall and does not swing. At the right end of the roller, a brass cap was put on with a ¾″ square hole in the end of same. The bracket at the right end of the roller swings in a circle and the square end of the crank shaft meshes into the square hole in the cap on the end of the roller. A latch that drops down on the arm of the bracket holds it in the proper place. The tension put on the spring of the tin roller up in the map nest is fully strong enough to unroll and raise the map when you wish to do so. A slight jerky motion of the crank of the bracket will set the dogs in the roller above just as easy as the present way of doing it by hand.

The operator, standing near the swinging bracket, can easily stab the pin on the other end of the roller into the stationary bracket at the left end, on account of the light weight of the cork pine bottom roller, swing the right end bracket into place, drop the latch, and then turn the crank.

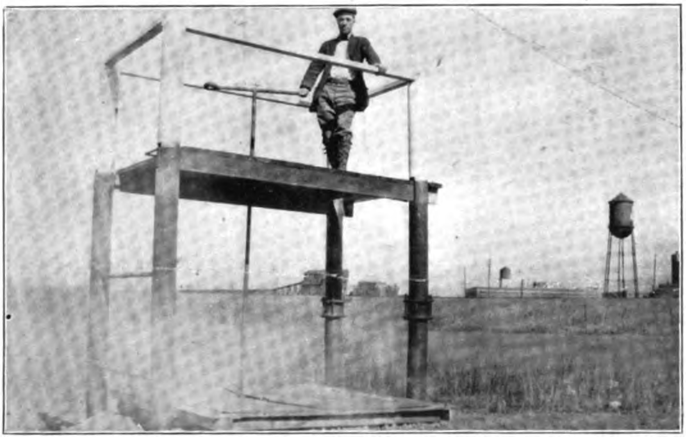
This wrinkle solved a problem that had caused considerable damage to the bottom of the large maps from trailing on the floor when in use.

Wrinkle No. 9.

EXTENSION STEM FOR GATE VALVE, TO BE USED IN CASE OF HIGH WATER IN OVERFLOW DISTRICT.

A. E. MCKIEARNAN, LONE STAR GAS COMPANY. DAN TAYLOR, DALLAS GAS COMPANY.

Corner posts are made of 8″ junk pipe. Platform is built of wood. Extension stem is iron or steel, with a socket on the



Wrinkle No. 9.

bottom made to fit main valve stem, with wheel removed. Extension stem is fastened below with a key, to keep anyone from removing it and is locked to corner post with a chain to keep anyone from closing or opening the valve.

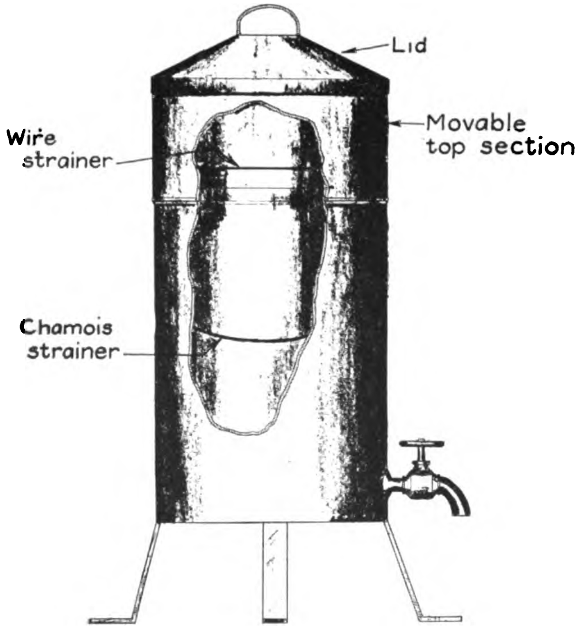
Wrinkle No. 10.

TANK FOR CLEANING AND STRAINING GASOLINE.

JAS. MCCARTY, THE EAST OHIO GAS CO., CLEVELAND, OHIO.

Gasoline used for washing the top part of tin meters gets very dirty.

With this Wrinkle, gasoline is cleaned and strained, and used over again.



GASOLINE STRAINER

Wrinkle No. 10.

Wrinkle No. 11.

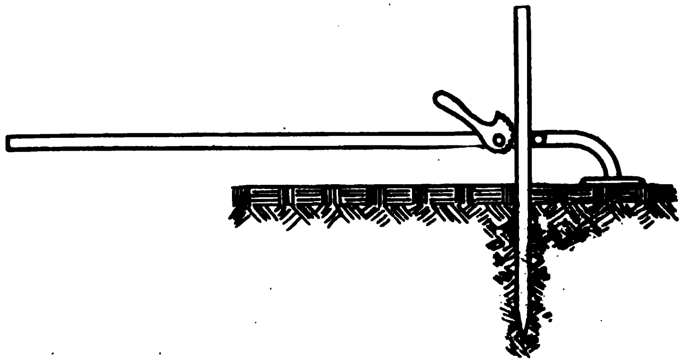
TO REMOVE HEAVY BOULDERS.

JAMES J. CUMMINS, PRESSURE DEPARTMENT, THE OHIO FUEL SUPPLY CO., COLUMBUS, OHIO.

In running a trench, we often came against a large boulder and it must be removed or destroyed.

A simple method is to loosen the soil from underneath the boulder, next slip a heavy plank under it. Then two or more men lift on each end of the plank and hoist the boulder to the surface.

A boulder weighing from 500 to 600 pounds can easily and quickly be removed in this manner.



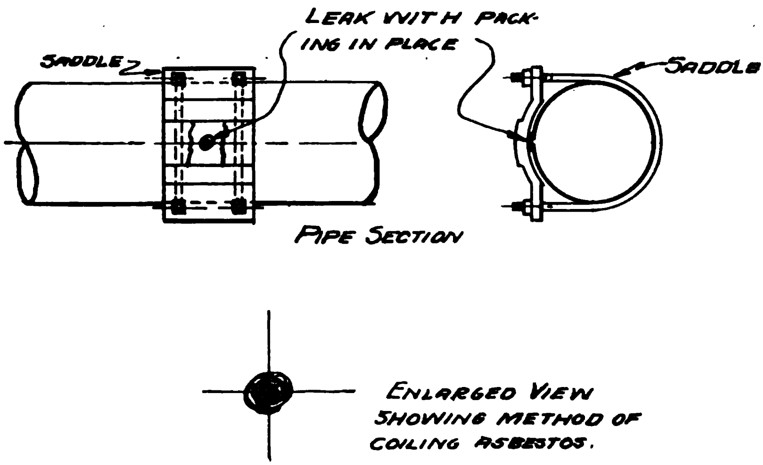
Wrinkle No. 12.

Wrinkle No. 12.

TOOL FOR PULLING TEST BAR FROM PAVEMENT OVER MAIN LINE.

W. J. GAGEN, FORT WORTH GAS CO., FORT WORTH, TEXAS.

This tool consists of a lever as shown. The lever is made from one inch by one and one-half inch steel and is fitted with a jaw made up of a pin on one side and a sharp toothed grip on the other.



Wrinkle No. 13.

Wrinkle No. 13.

EASY WAY TO REPAIR A LEAK.

ED. CANNY, MAIN LINE MAN, KANSAS NATURAL GAS CO., COLUMBUS, KANSAS.

Easy way to repair leaks on high or low pressure line and especially on pipe that is pitted and rusted. Take blind saddle made to fit pipe, some rope asbestos about one-quarter inch in diameter, roll in a tight circle until you have a pad a little larger than the leak to be repaired, then take some roof cement paint or asphaltum and cover the pad to fill seams with same. Then take another pad a little smaller than the first, use paint or asphaltum as before, stick second pad to center of the first, stick both to saddle and place over leak, tighten saddle and leak is repaired.

Wrinkle No. 14.

NOTICE CARD.

O. M. BALDWIN, THE EAST OHIO GAS COMPANY, KENT, OHIO.

This card is handed out at the time application is made for a meter. The applicant is instructed to read the card carefully, so that there will be no delay about setting the meter when the gas man comes to do so. These instructions are printed on a card of suitable size.

BE SURE TO READ THIS.

TO AVOID DELAY IN HAVING GAS TURNED ON KINDLY OBSERVE THE FOLLOWING DIRECTIONS.

First — See that all gas appliances have solid connections: that is, use pipe instead of hose for connecting stoves, grates, etc.

Second — Do not connect any gas appliance unless it has a proper flue connection.

Third — Be sure that all openings in gas lines are plugged or capped.

Fourth — Place an independent valve on riser to your gas range or heating stove.

Fifth — Examine each opening where stove pipe connects to chimney to see that it is free of soot and other obstructions.

The above directions are to insure safety and our employes are instructed not to set a meter unless these directions are complied with.

Wrinkle No. 14.

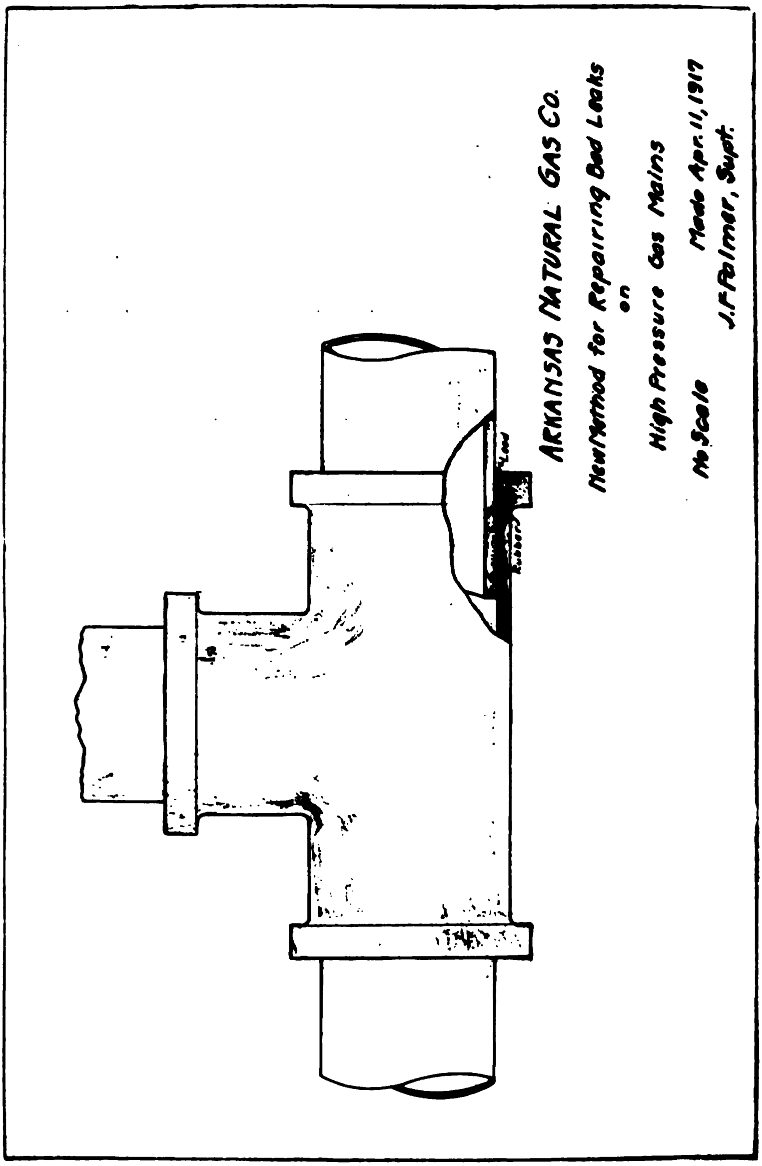
Wrinkle No. 15.

METHOD OF REPAIRING HIGH PRESSURE LEAKS.

J. F. PALMER, SUPERINTENDENT, ARKANSAS NATURAL GAS COMPANY, SHREVEPORT, LOUISIANA.

Occasionally there is found a leak in a fitting that is difficult to repair by the ordinary method. The prints herewith illustrate a method that has been successfully used under high pressure.

Cut off small "V" from around a collar leak, or coupling rubber. Insert in recess, fasten ends together by tying, then pour lead in the recess and calk.



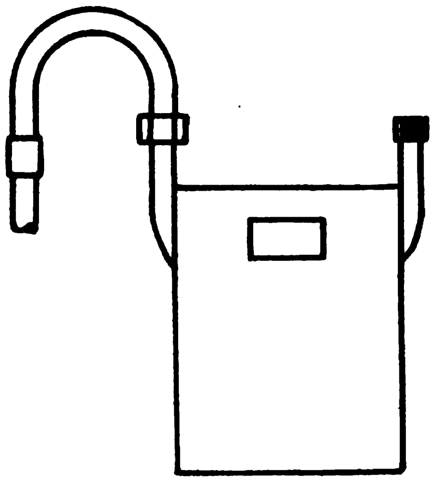
Wrinkle No. 15.

Wrinkle No. 16.

TO PREVENT TIPPING OF METERS.

J. H. STINSON, FORT WORTH GAS CO., FORT WORTH, TEXAS.

Use a return bend on one side of meter instead of usual fittings.



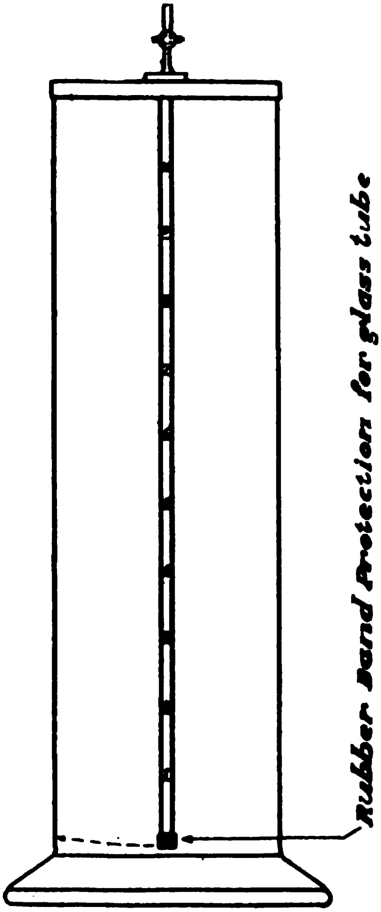
Wrinkle No. 16.

Wrinkle No. 17.

PROTECTION FOR GAS GRAVITY TESTER.

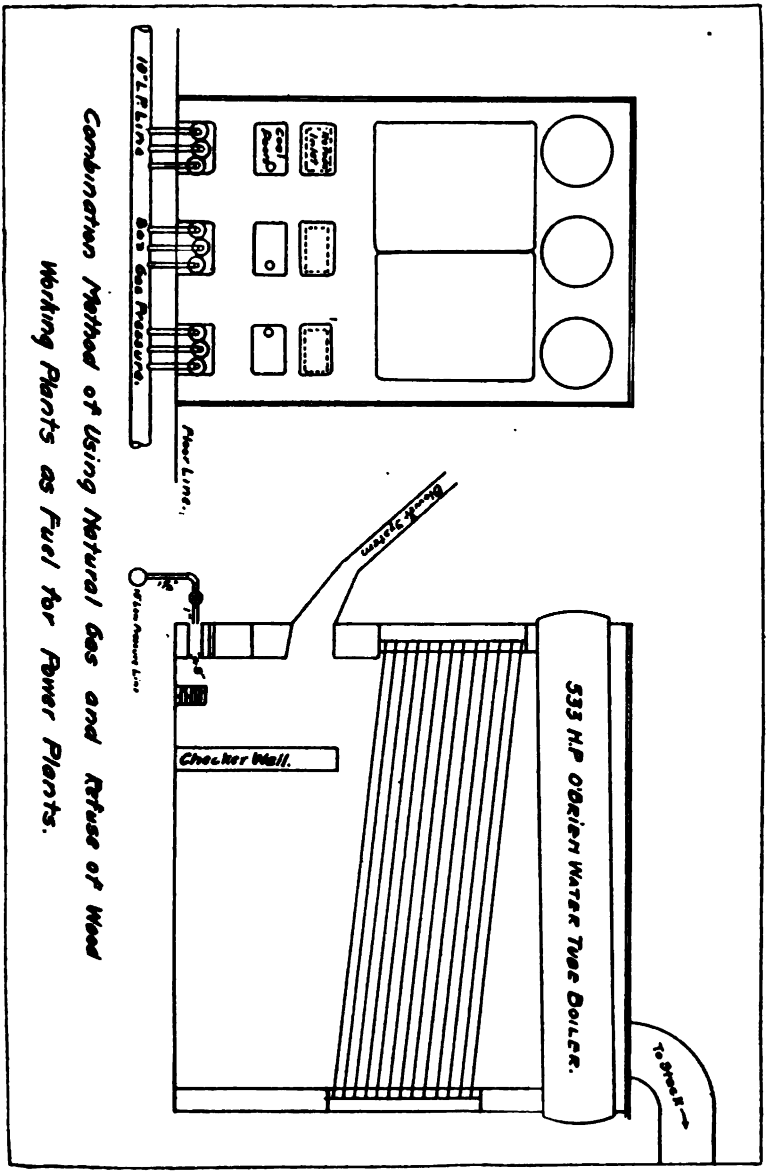
C. E. BROCK, DIVISION SUPERINTENDENT, EMPIRE GAS AND FUEL COMPANY, BARTLESVILLE, OKLA.

Our company has experienced great difficulty in keeping gravity tubes from breaking. By using a rubber band around the bottom of the gravity tube, it keeps the tube from coming in contact with the water tube and saves about 90% of the breakages.



Gravity Flask

Wrinkle No. 17.



Wrinkle No. 18.

Wrinkle No. 18.

COMBINATION METHOD OF USING NATURAL GAS AND REFUSE OF WOOD WORKING PLANTS AS FUEL FOR POWER PLANTS.

W. T. ROBERTS, C. W. KRAMER, ENGINEERING DEPARTMENT,
ARKANSAS NATURAL GAS COMPANY,
LITTLE ROCK, ARKANSAS.

This sketch shows the method employed in burning natural gas and refuse, consisting of saw dust, shavings, chips and small blocks, from wood working shops, as fuel in a power plant. The gas is supplied through a 10" low pressure header in the subject sketched, from which it goes through a one and a half inch pipe ($1\frac{1}{2}''$) reduced to one inch ($1''$). The gas flows to the mouth of the eight inch port in front of the boiler, from whence it is pulled with air into the furnace against a wall to "break up" and mix same completely for combustion.

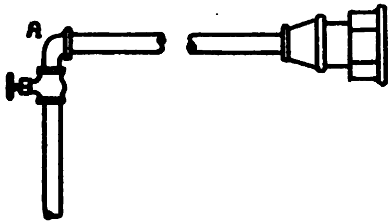
In this installation the refuse from the shops is conveyed a distance of five hundred feet to the boilers, by means of a blower system, having an 8 ounce suction, which delivers the refuse directly into the fire box, where it is completely consumed, very materially lowering the fuel cost. No ash remains to cause trouble, as it is reduced to powder form and goes out the stack.

Wrinkle No. 19.

DEVICE FOR FILLING METER PROVER WITH GAS.

J. R. GILBERT, 1012 BOIS DARC ST., FORT WORTH, TEXAS.

This connection is used at large hose opening of prover, and by means of loosened street ell at (A), can be swung back out of the way when necessary to use the prover for large meters.



Wrinkle No. 19.

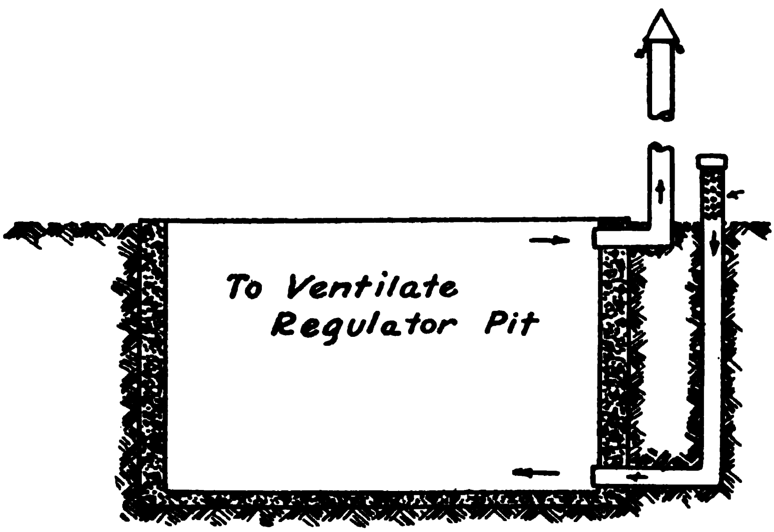
Wrinkle No. 20.

TO VENTILATE REGULATOR PIT.

J. H. STINSON, FORT WORTH GAS CO., FORT WORTH, TEXAS.

Use two 4-inch pipes. Connect one at top of pit and use a cover over the top. Connect the other to the bottom of the pit and drill holes to let in air.

(A) should extend a few feet above (B).



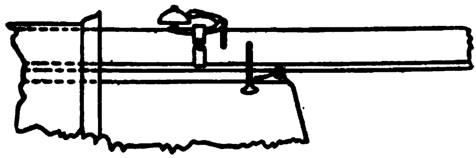
Wrinkle No. 20.

Wrinkle No. 21.

WARNING BELL ATTACHED TO PROVER.

J. R. GILBERT, 1012 BOIS DARC ST., FORT WORTH, TEXAS.

While running a slow check test on a meter the operator may give his attention to other matters and the bell will give



Wrinkle No. 21.

a warning when the test is nearly finished. The bell is attached to the prover with a movable band so as to allow setting for tests of various lengths.

Wrinkle No. 22.

DEVICE TO PREVENT REVERSING OF INLET AND OUTLET OF METER.

G. C. REED, TELEPHONE FOREMAN AND METER INSPECTOR, LONE STAR GAS COMPANY, FORT WORTH, TEXAS.

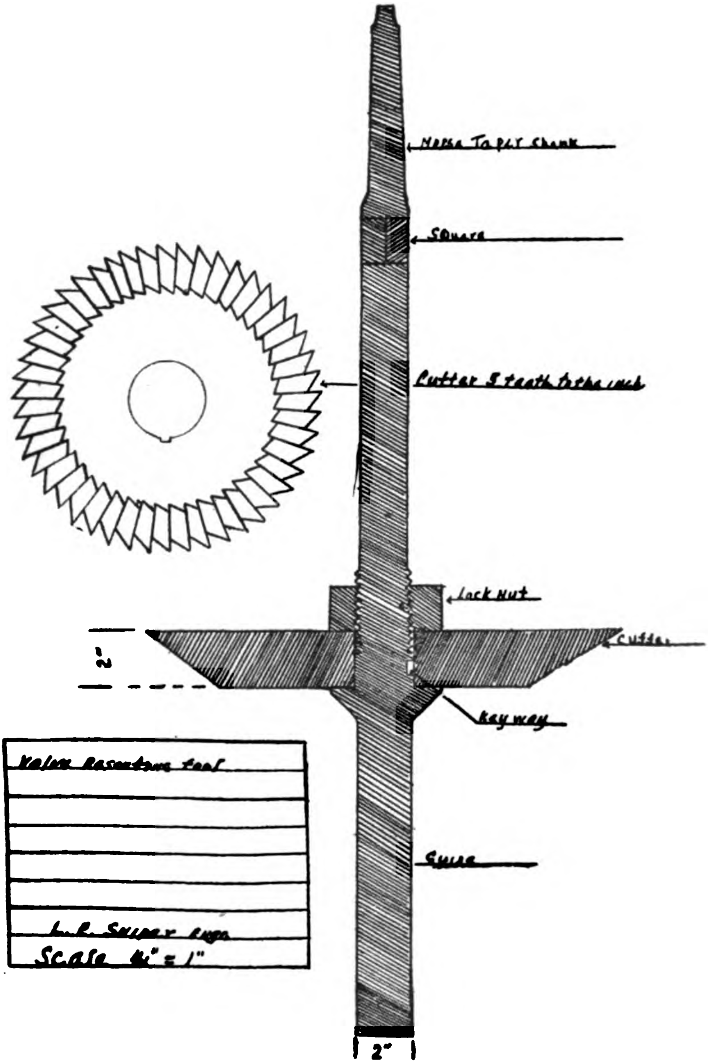
Place a check valve in the neck of the outlet on meter. If meter is in normal position, the flow of gas keeps this valve open. If meter is reversed to prevent the registering of gas, this check valve is closed by the pressure of the in-coming gas, thereby effectively cutting off the supply until meter is reversed in proper position. It would be almost impossible to detect the presence of this valve.

Wrinkle No. 23.

VALVE RESEATING TOOL.

L. E. SNIDER, ENGINEER, ARKANSAS NATURAL GAS COMPANY.

Tool for re-grinding or re-setting valve seats, in place. Especially adapted for use in large gas engines such as used in compressing stations.



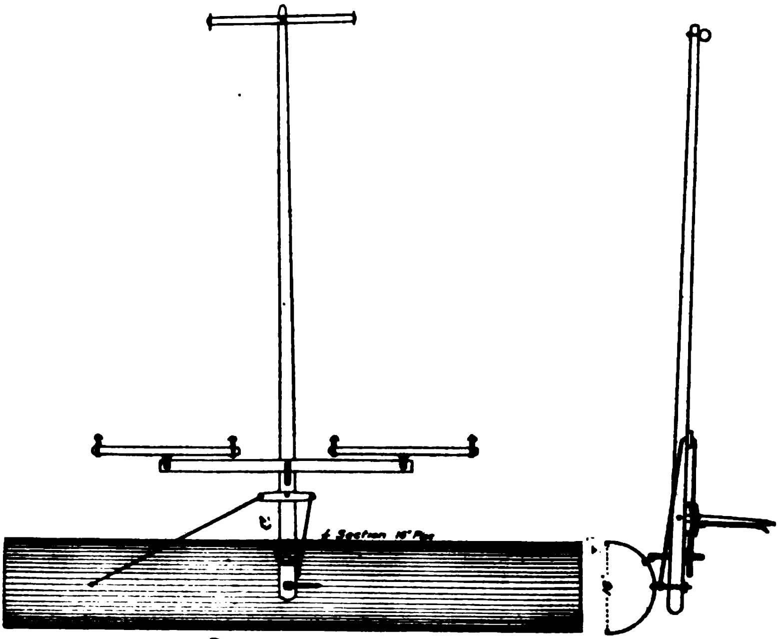
Wrinkle No. 23.

Wrinkle No. 24.

ROAD DRAG.

H. O. BALLARD, SUPERINTENDENT PRODUCTION, WICHITA NATURAL GAS CO., BARTLESVILLE, OKLA.

The above drawing shows a very efficient road drag where oil companies have to keep their private roads in condition.



ROAD DRAG

Wrinkle No. 24.

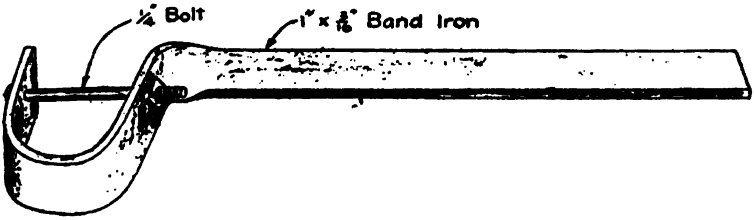
This drag consists of 8 ft. of 16″ or 18″ pipe, ripped in half. By certain adjustments, this drag can be made to not only drag roads, but grade them as well.

Wrinkle No. 25.

ADJUSTABLE METER SUPPORT.

O. C. HARTSOUGH, THE EAST OHIO GAS CO., CANTON, OHIO. P. KENNEDY, THE EAST OHIO GAS CO., CLEVELAND, OHIO.

This Meter Support is attached to the riser of the service and is set at any height desired. It gives more satisfaction than the old style meter spuds which were always liable to get loose.



Wrinkle No. 25.

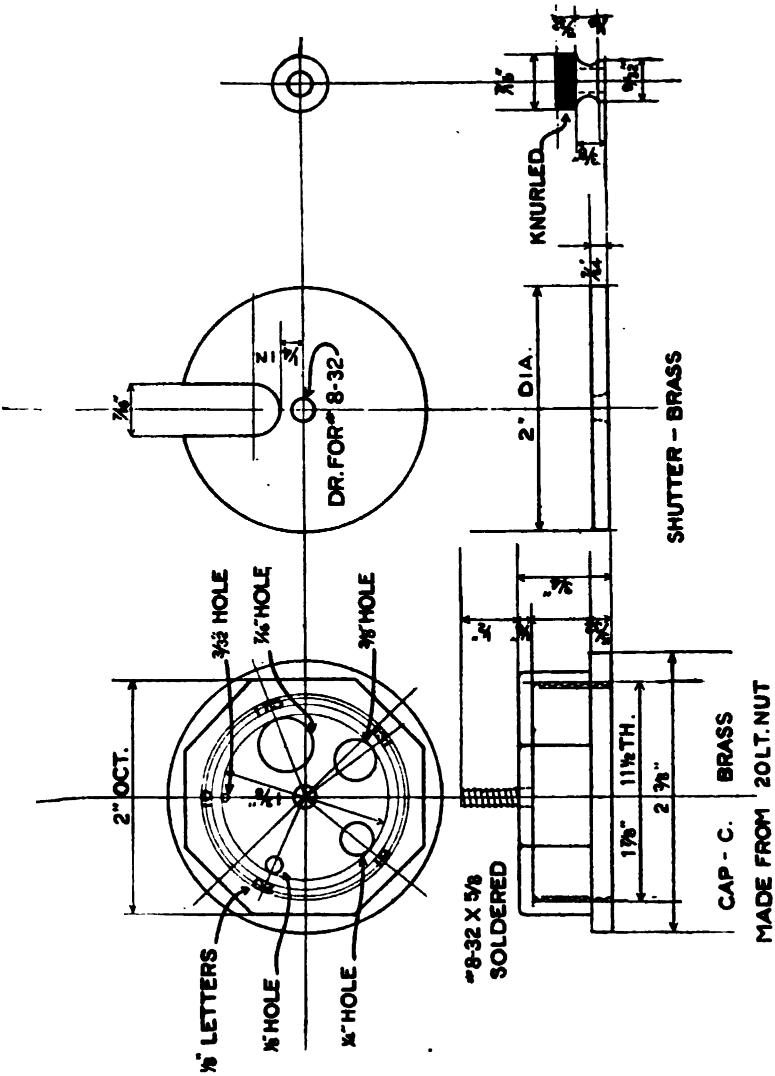
Wrinkle No. 26.

MULTIPLE RATE CAP FOR TESTING METERS.

E. C. WEISGERBER, SALES MANAGER, EQUITABLE METER CO., PITTSBURGH, PA.

In testing meters it is always necessary to test them for the different rates of flow, namely, 10 ft. per hour, 20 ft., and then upwards to the open flow test. Most companies who do this work have a different cap for each flow, and it is necessary to unscrew the one cap and place another, etc. In many cases the caps are lost, and all of this takes considerable time, but by making the multiple rate cap, as per above sketch all of these tests except the open flow test can be made through the cap, as per the above.

The above illustration shows a standard 20 light meter nut in which a brass blank has been soldered, and this blank is drilled with holes which will pass the desired amount of gas at the desired prover pressure, namely, the above holes are of sufficient size to pass 10, 20, 61, 131 and 175 cu. ft. of gas or



Wrinkle No. 26.

air at $1\frac{1}{2}''$ pressure. These caps can also be made for 5 light, 10 light and other sizes, and their use will greatly facilitate the testing of meters.

A shutter is made, as per sketch, with an opening large enough to allow the largest hole exposed. This shutter is held in place by a nut which turns on the screw which has been soldered to the cap proper, and the holes in the meter cap are placed so that the shutter can be turned in any direction, but the slot only allowing the desired hole for capacity to be open, thereby the gas or air must flow through the desired orifice.

Wrinkle No. 27.

FORMS FOR KEEPING RECORD OF TESTS AND LOCATION OF PROPORTIONAL METERS.

C. W. KRAMER, ENGINEERING DEPARTMENT, ARKANSAS NATURAL GAS COMPANY, LITTLE ROCK, ARKANSAS.

Form No. 140-A is self-explanatory, and, after a meter has been tested in the field, the report is sent to the Meter Department. The form is in duplicate, in book form, and duplicate copy is to be retained by the Field Inspector. These test records are filed according to their consecutive number.

Form No. 629 is the Meter Department's record of the meters. The face of the card is used to show the make, size, capacity and location of meter. The reverse side is used to keep a record of the tests, and on it is entered the date of the test, the consecutive number of the test slip (Form 140-A), the condition — fast or slow — in which the meter was found and left, also the initials of the person who ran the test.

The card is filed according to the district in which the meter is located, and, in that sub-division, according to the serial number of the meter.

FORM NO. 140A-2-1-17

ARKANSAS NATURAL GAS CO.

METER TEST REPORT.

DATE ...., 191....

....

LOCATION ....

MAKE .... SIZE .... No. .... CAPACITY ....

READING BEFORE .... AFTER ....

BAROMETER .... TEMPERATURE GAS .... ATMOS. ....

GRAVITY .... INCHES WATER ....

FLOWOMETER TEST.

Vol. Per Hour.	Inspection Test.	Final Test.	CONDITION.
Cu. Ft.	Per cent.	Per cent.	
			MATERIAL USED.
			REMARKS.
			ARKANSAS NATURAL GAS CO.
			Inspector.

Wrinkle No. 27.

Form No. 629

METER CAPACITY. No.

GAUGE, No. RANGE.

Location.	Consumer.	Date.	Set Order.	Rem. Order.

TEST RECORD.

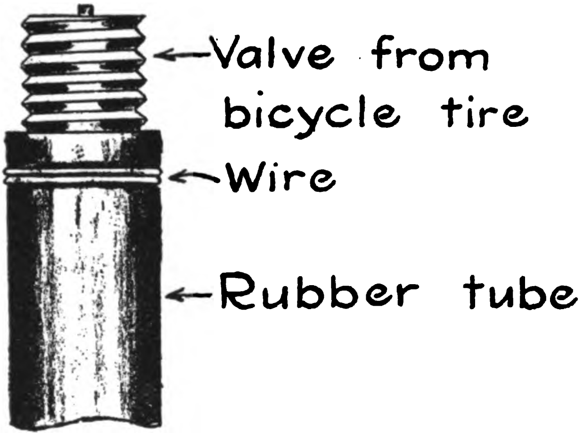
Date.	No.	Found.	Left.	By	Date.	No.	Found.	Left.	By

Wrinkle No. 28.

VALVE FOR GAS BAG TUBE.

WM. HAGAN, THE EAST OHIO GAS COMPANY, CLEVELAND, OHIO.

This wrinkle consists of attaching a bicycle tire valve to the tube of a rubber gas bag, and connecting same to a pump for inflation.



Wrinkle No. 28.

Wrinkle No. 29.

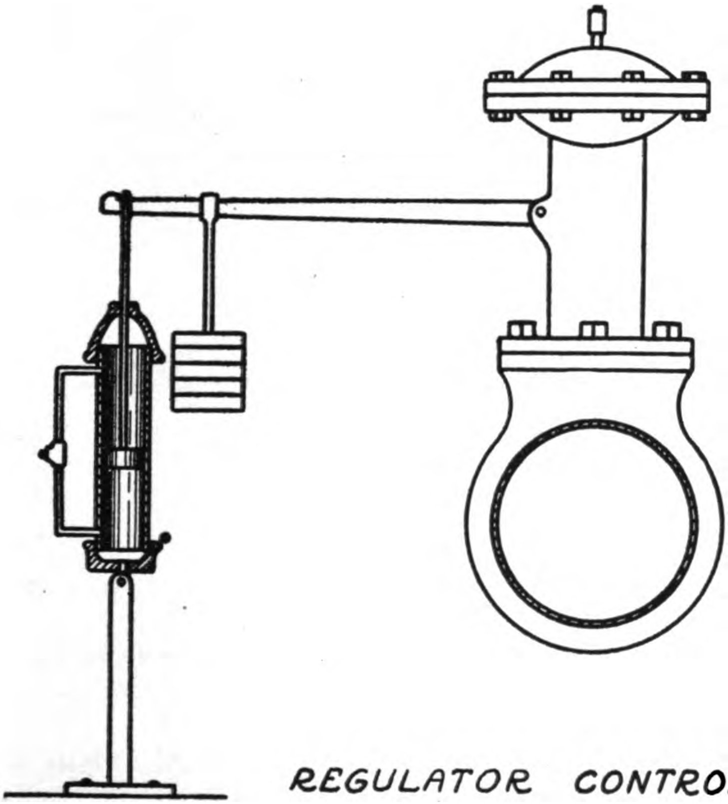
REGULATOR CONTROL.

R. B. LLOYD, SUPERINTENDENT LINES, H. O. BALLARD, SUPERINTENDENT PRODUCTION, WICHITA NATURAL GAS CO., BARTLESVILLE, OKLA.

This wrinkle consists of an old piece of working barrel with a solid cap on the bottom end and a reducer on the top end, with a ¾" piston rod extending from the regulator arm to the piston ring inside the barrel, with a ¼" By-Pass extending from the bottom to within 5" of the top, with a common brass cock in the By-Pass. The barrel is filled with any kind of heavy oil. This is to keep a regulator from opening or closing too far when the regulator is inclined to stick. The By-Pass cock being closed to allow but a small amount of oil to pass. Should the regulator stick up and finally loosen, it will not allow

the weights to drop fast, but to lower slowly. The same thing applies, should the regulator lever stick down.

This works very effectively whenever there is an uneven flow through the regulators, like glass plants or close to an orifice meter.



REGULATOR CONTROL

Wrinkle No. 29.

Wrinkle No. 30.

MAIN LINE REPAIR SLEEVE.

LEN RYAN, BLACKWELL, OKLA.

In case of a hole in a main line of plain end pipe, a good method of repair is to use an ordinary sleeve coupling with

followers and rubbers. Disconnect the line at the nearest joint and slip a sleeve with followers along the pipe until the sleeve covers the hole. Place rubbers and make up as an ordinary joint. This gives a repair as good as a new joint and is useful where a line can be shut out for repairs.

Wrinkle No. 31.

RUBBER GASKETS FOR METER CONNECTIONS.

E. A. MCSHERRY, FORT WORTH GAS COMPANY.

The use of rubber gaskets will eliminate leaks in connecting up meters.

Wrinkle No. 32.

OIL-STEAM BURNER FOR BOILERS.

E. WILBERDING, ENGINEER, THE EAST OHIO GAS CO., CLEVELAND, OHIO.

(See drawing on page 177.)

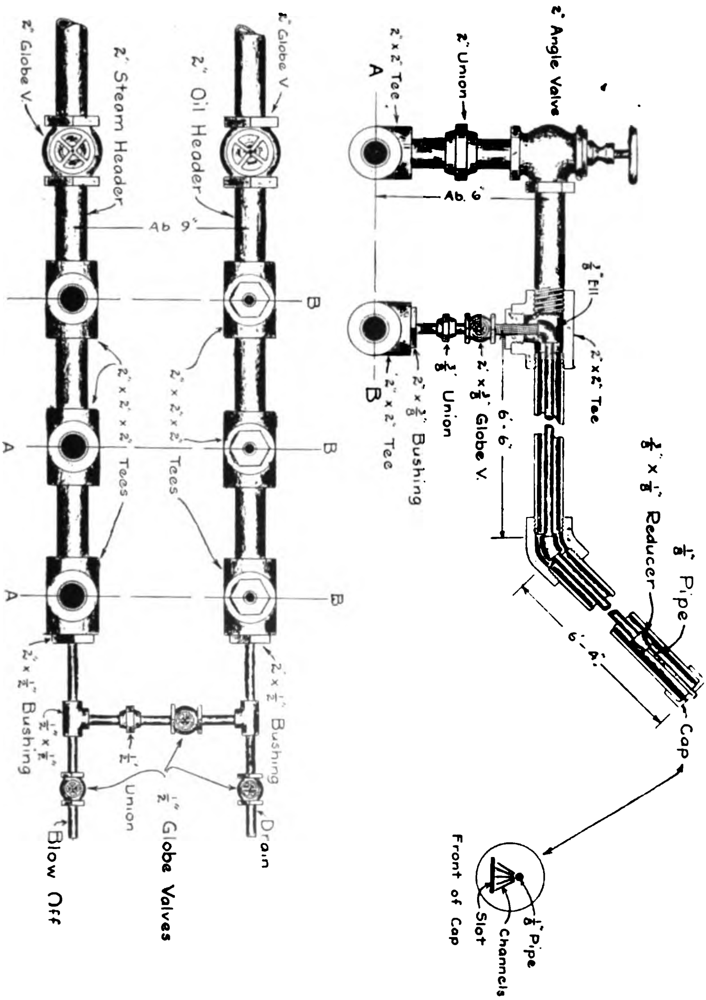
Wrinkle No. 33.

MIXER FOR USE ON SMALL GASOLINE ENGINE TO BURN NATURAL GAS.

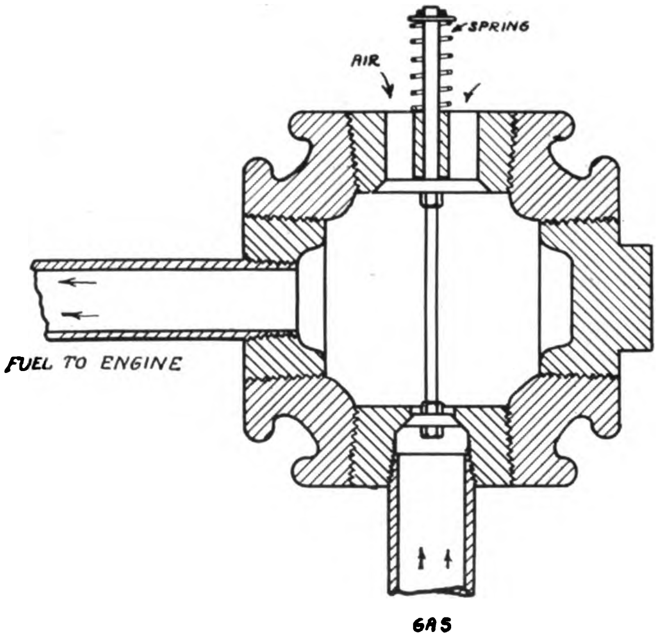
FREDRICK F. DOYLE, ASST. CHIEF ENGINEER, MIDWAY GAS CO., TAFT, CALIFORNIA.

(See drawing on page 178.)

The following sketch shows how a 2" Cross, three 2" Plugs and a 2" x ½" Bushing were used to make a mixing chamber for natural gas and air which attached to an engine formerly run on gasoline and using a carburetor. A little machine work was required. The area of the air opening should be from 9 to 12 times the area of the area of the gas opening, depending upon the kind of gas used.



Plan
OIL-STEAM BURNER
Wrinkle No. 32.



MIXER FOR SMALL GASOLINE ENGINE TO BURN NATURAL GAS

Wrinkle No. 33.

Wrinkle No. 34.

ERECT SIGNS TO SHOW LOCATION OF LINES.

H. P. ZIESCHANG, THE OHIO FUEL SUPPLY CO., COLUMBUS, OHIO.

In walking lines in a strange district it is very difficult to find the line especially where the land is plowed every year.

I suggest, that when a line is constructed, that a board be nailed on the fence and painted white and the name of the line and property line painted in black.

This would be helpful to any man working on the lines for repair work, etc.

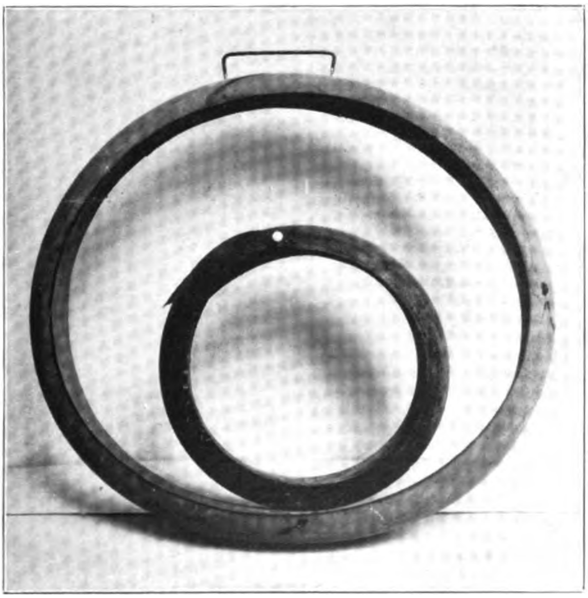
Wrinkle No. 35

USE STAPLE IN PLACE OF TACK.

WM. HEAZLETT, SHOP FOREMAN, PEOPLES NATURAL GAS CO., LATROBE, PA.

The photo is of a little staple which I use for fastening rubber rings together when putting on split sleeves where lines are broken. I find they will hold against a very high pressure.

The old way of using tacks is not very satisfactory as the pressure blows the tacks loose and the tacks do not make a good



Wrinkle No. 35.

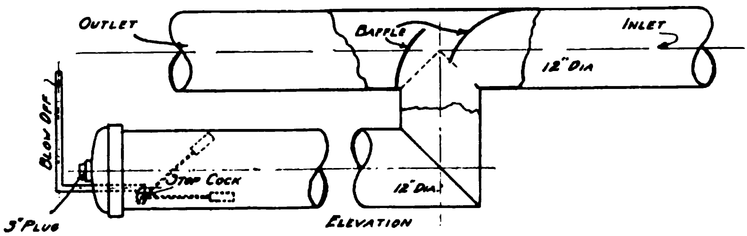
job, but the staple holds the ends in a perfect circle as you will see in the photo, while tacks leave a loose end. The staple should be about two and one-half inches long and made of soft wire, with tongs long enough to go through the rubber and turn enough to make it impossible to pull out.

Wrinkle No. 36.

BAFFLE TEE DRIP WITH AUTOMATIC BLOW OFF.

R. B. LLOYD, SUPERINTENDENT LINES, H. O. BALLARD, SUPERINTENDENT PRODUCTION, WICHITA NATURAL GAS CO., BARTLESVILLE, OKLA.

This drip is made entirely of welded fittings. The welding being done by the Oxy-Acetylene process. The automatic blow-off device consists merely of a stop cock with a float attached to it. The float being made of thoroughly dried pine wood covered with copper and thoroughly sealed. The 3" plug is for emergency use in case the automatic blow-off should get out of order.



Wrinkle No. 36.

Wrinkle No. 37.

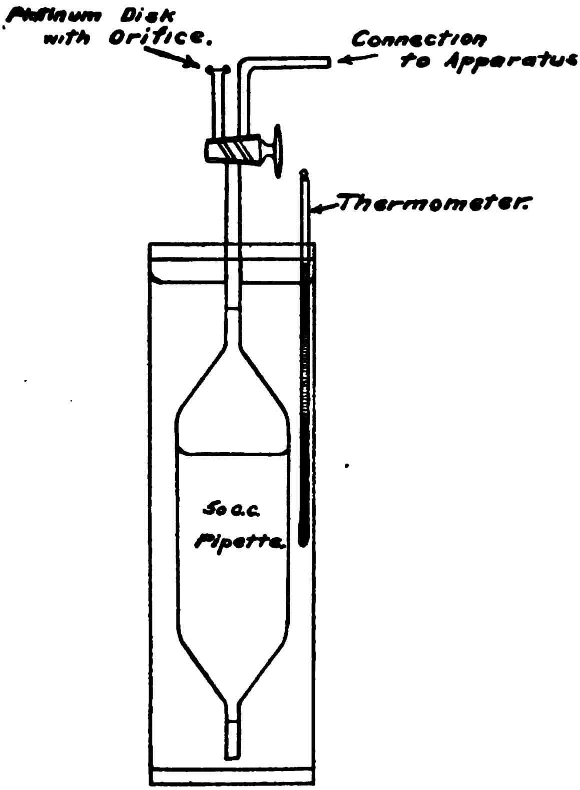
MEASURING THE SPECIFIC GRAVITY OF A SMALL SAMPLE OF GAS.

E. E. LYDER, CHIEF CHEMIST, EMPIRE GAS & FUEL CO., BARTLESVILLE, OKLA.

It is sometimes desirable to determine the specific gravity of small amounts of gas brought to the laboratory.

This can be done on samples of 75 c. c. or more by use of the following device:

A 50 c. c. pipette with a three-way stop cock sealed on top of it, as shown in the diagram, is inserted into a glass cylinder, which is kept nearly full of water. One of the leads to the stop cock is equipped with a platinum disk, sealed into



Wrinkle No. 37.

the glass. Through the disk is a small orifice for the discharge measurement.

The device is connected to a gas analysis apparatus and the gas upon which the determination is to be made, is forced into the pipette. The stop cock is then turned to connect the pipette and orifice and time measurements are taken with a stop watch as the water displaces the gas past two given poins on the pipette.

After running the sample of gas, air is run, and the densities compared by the time they pass a given orifice as in an ordinary specific gravity bottle.

Wrinkle No. 38.

TO ENLARGE CAPACITY OF METERS.

J. R. GILBERT, 1012 BOIS DARC ST., FORT WORTH, TAXAS.

Take off side tubes and file out the openings into the meters. File wherever possible and attach side pipes of brand known as "Texas Special". This will increase the capacity of small meters remarkably, especially three light meters.

Wrinkle No. 39.

TONG FOR COMPRESSING RUBBER COUPLING.

E. H. CYPHERT, PIPE LINE FOREMAN, WICHITA PIPE LINE CO., BARTLESVILLE, OKLA.

(See drawing on page 183.)

This wrinkle consists of a bar of iron ¾" x 2" x 4' long and one piece the same size, 18" long, bent to the shape of a common canthook. Whenever the rubbers will not allow the followers to go together so that the commonly used bolt is too short for threads to start; by hooking this device over the coupling and pulling the leaver, it will compress the rings so that taps may be easily started.

Wrinkle No. 40.

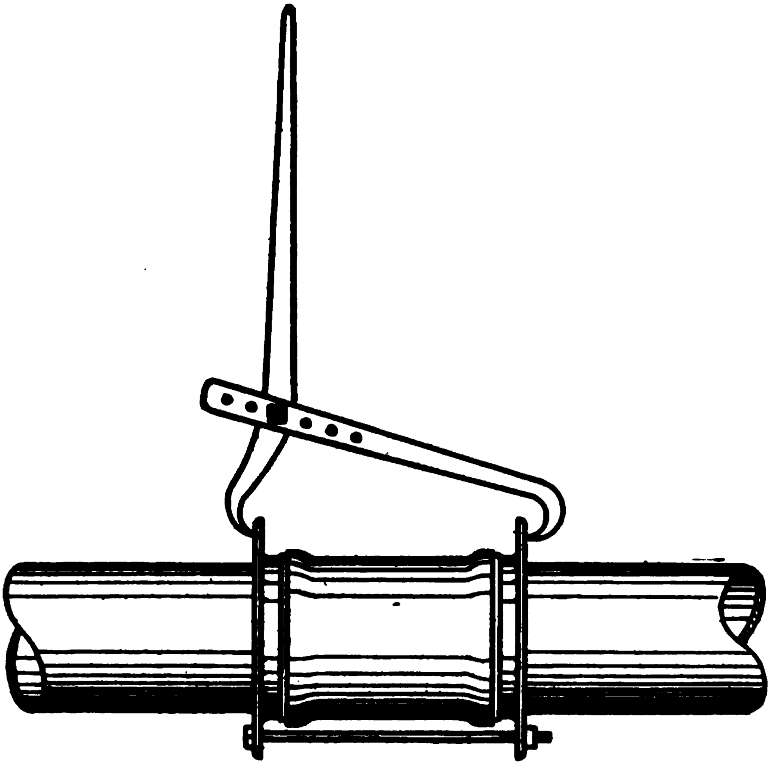
ALWAYS REPEAT TELEPHONE ORDERS.

JAMES J. CUMMINS, PRESSURE DEPARTMENT, THE OHIO FUEL SUPPLY CO., COLUMBUS, OHIO.

When it is necessary to give an order over the telephone, be sure to make the party who receives the message repeat it back to you.

This is important in any department of the business, but is particularly important in the matter of receiving field reports regarding pressure, etc., as this is mostly over long distance and a word or two misunderstood might make serious trouble.

Repeating the message this way also may bring to mind something that has been forgotten.



TONG FOR COMPRESSING RUBBER COUPLING

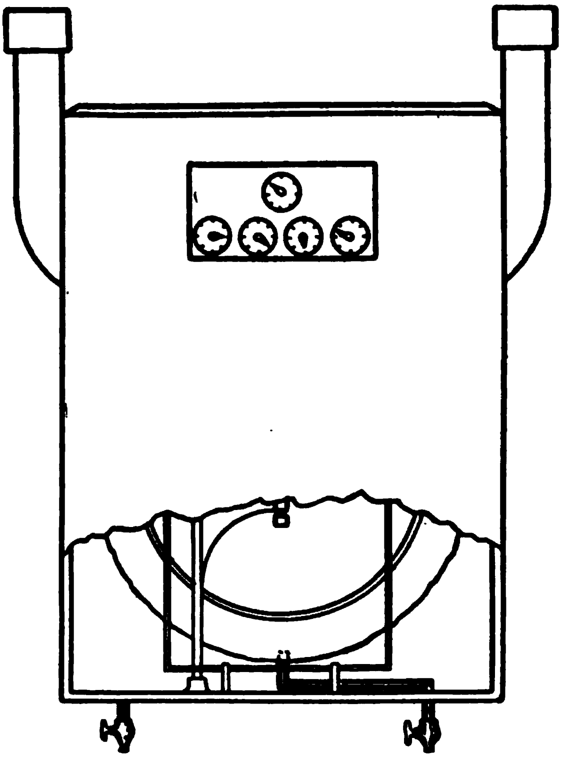
Wrinkle No. 39.

Wrinkle No. 41.

DRAIN FOR METERS.

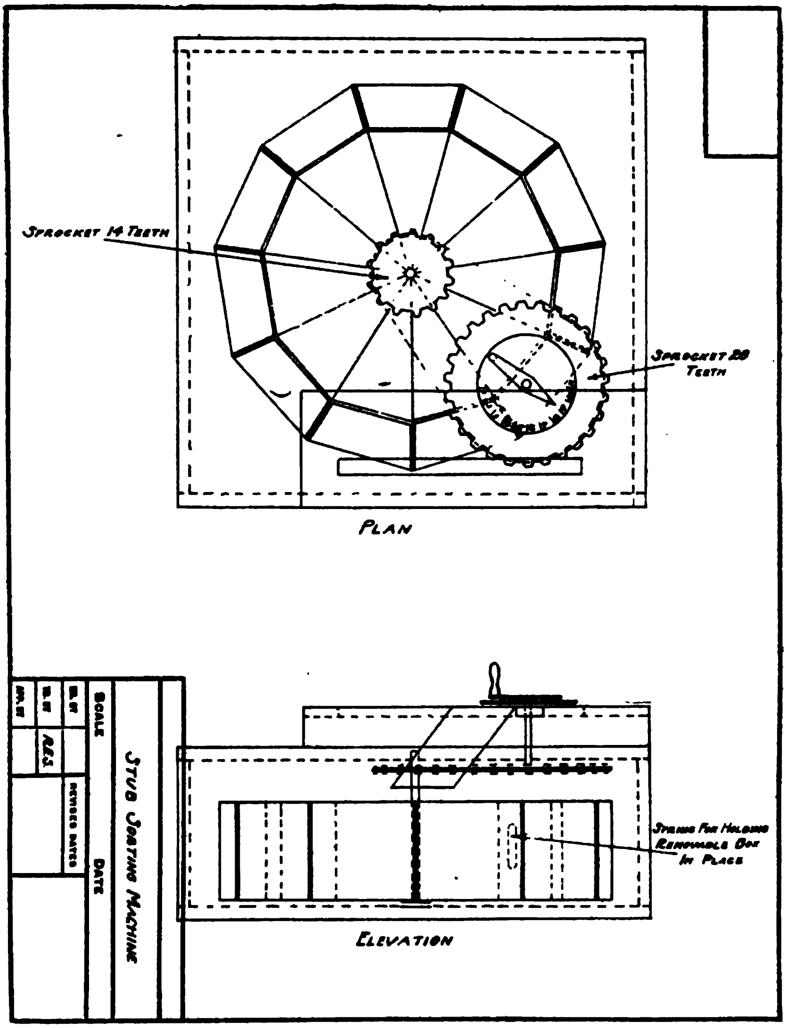
J. R. GILBERT, 1012 BOIS DARC ST., FORT WORTH, TEXAS.

Attach a small brass pipe to the under ring of the diaphragm and run under and around the leather to avoid rubbing. Attach small cocks on the outside and make all joints absolutely tight.



Wrinkle No. 41.

To drain the meter, open cocks and the gas pressure will soon force out the condensation. This device is useful especially on large meters.



Wrinkle No. 42.

Wrinkle No. 42.

COUPON CUTTING MACHINE THAT SAVES TIME.

F. W. SCOVELL, CASHIER, JOPLIN GAS CO., JOPLIN, MISSOURI.

(See drawing on page 185.)

The drawing herewith shows a coupon cutting machine attachment.

The idea of the machine is to save time of sorting stubs into their thousands at the time same are receipted by setting dial to any number from one to eleven. All stubs from number one to one thousand will go into box number one; one thousand to two thousand in ,box number two, and so on up to and including ten thousand. Setting of dial only requires second of operator's time and each stub has gone to its proper box. At close of day's business half of the sorting is done, all the stubs are in their thousand order, face up and in neat order, thus effecting a saving of time according to number of stubs handled. If you should want to refer to any stub at any time during the day you can locate same instantly.

This distributer can be attached to any coupon cutting machine in short time as all that is necessary is to shorten or lengthen dial shaft put in chute, cut hole in counter 2" square and fasten box to under side of counter.

Size of box 18" square, wheel 16" diameter, wheel having eleven compartments.

Wrinkle No. 43.

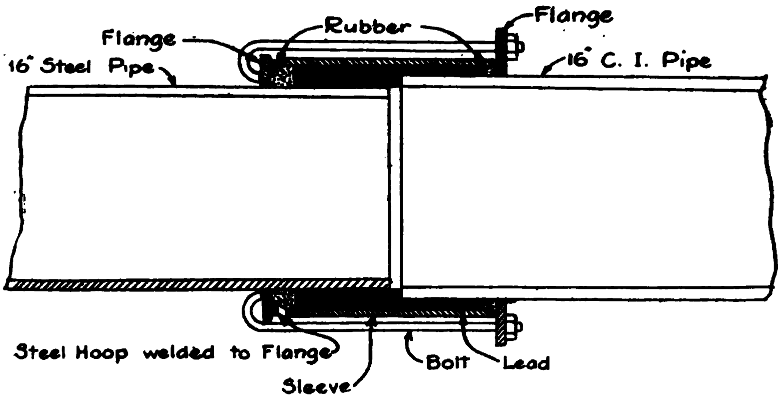
STOPPING LEAKS ON A LEADED SLEEVE JOINT.

F. DOOLING, THE EAST OHIO GAS CO., CLEVELAND, OHIO.

(See drawing on page 187.)

The difference in O. D. between cast iron and steel pipe make it necessary to use rubbers of different thickness. The flanges and "J" bolts were home-made."

This method has given satisfaction and is vouched for by Mr. Dooling.



Wrinkle No. 43.

Wrinkle No. 44.

"A WRINKLE WORTH TRYING."

GEO. B. SIPE, VICE PRES. AND GEN. MGR., LOUISIANA GAS CO.,
SHREVEPORT, LOUISIANA.

(See drawing on page 188.)

The ordinary pilot used in jacking pipe under paving, across streets, and elsewhere does not provide against:

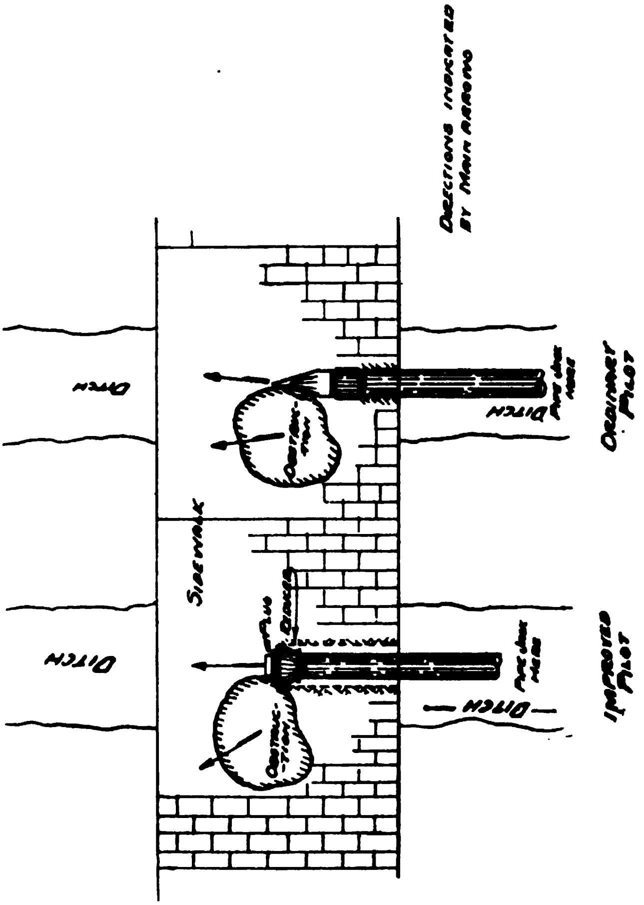
(1). The pipe being deflected from a straight course by coming in contact with pebbles or other obstructions, nor

(2). Having to leave a string of pipe in the ground, if any obstruction is encountered that necessitates beginning again, nor

(3). Friction along the entire length of the line.

By using a reducer and plug, making the pilot much larger than the pilot ordinarily used, overcomes all the difficulties enumerated above.

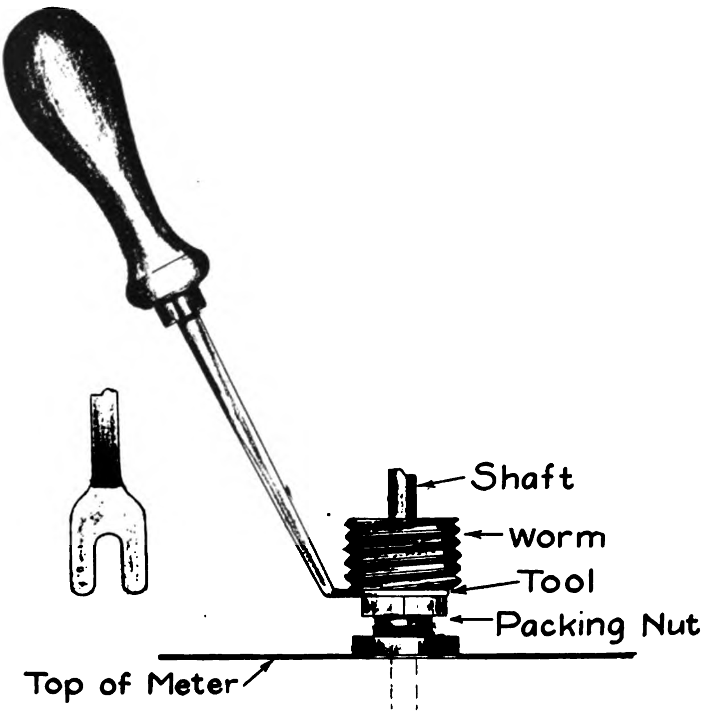
The long pointed pilot is easily deflected from a straight course by a pebble. The blunt reducer and plug will push it aside.



Wrinkle No. 44.

Should an obstruction be encountered that cannot be passed or pushed aside, by digging down to and removing the reducer allows the removal of pipe.

We have jacked eight inch pipe, by using such a pilot, a distance of two hundred feet without deflecting but a few inches; we have also jacked ten inch pipe successfully a distance of over forty to sixty feet under railroad tracks. **Try it.**



TOOL FOR HOLDING PACKING NUT

Wrinkle No. 45.

Wrinkle No. 45.

TOOL FOR STARTING METER PACKING NUT.

WM. TAYLOR, THE EAST OHIO GAS CO., CLEVELAND, OHIO.

(See drawing on page 189.)

This little tool is very handy for putting pressure on the packing nut in the top part of a tin meter, to overcome the resistance against the nut caused by the packing below.

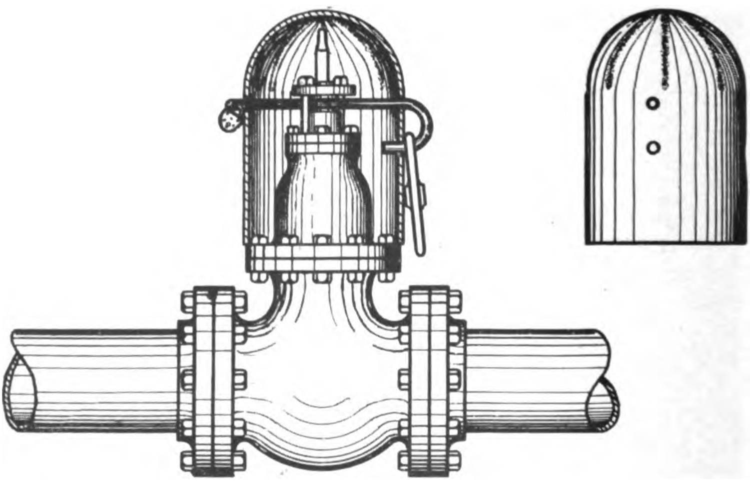
The worm is generally of such size that it is difficult to get nut started with the fingers. This tool overcomes this trouble.

Wrinkle No. 46.

NON-INFAMMABLE GATE BOX.

R. B. LLOYD, SUPERINTENDENT LINES, WICHITA NATURAL GAS CO., BARTLESVILLE, OKLA.

The above wrinkle consists of a piece of junk pipe welded on the top with a semi-clevice cut out of an old brake band with a slot cut in the pipe so as to allow the clevice to pass through the pipe under the stuffing box gland and extend through



COMBINATION GATE BOX AND SEAL

Wrinkle No. 46.

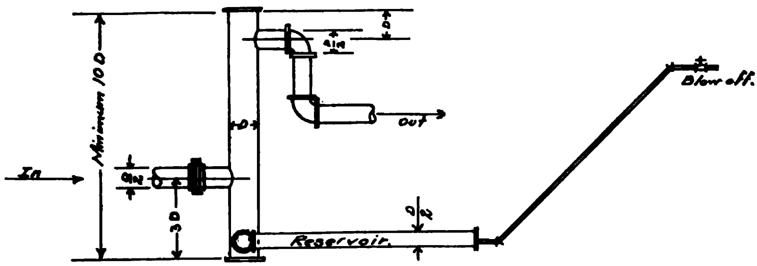
the opposite side of the gate box, with a hole in the end of the clevice to allow a lock. By hanging the gate wheel in the semi-clevice on the opposite side from the lock, not only locks the wheel to the gate, but also locks the gate at the same time.

This makes a gate box which is non-inflammable and much cheaper and more durable than the ordinary wooden box.

Wrinkle No. 47.

DRIP THAT STOPS MORE LIQUID.

ELTING HENDERSON, STATION SUPERINTENDENT, MIDWAY GAS CO., TAFT, CALIFORNIA.



Wrinkle No. 47.

The sketch of a drip for use on gas line explains itself.

We find that this type of drip stops a larger percentage of the liquid in our gas lines than any other type we have ever used.

Wrinkle No. 48.

TEST WHICH PROVES NATURAL GAS TO BE THE EQUAL OF ARTIFICIAL GAS IN BRAZING AND MELTING GOLD.

S. E. HAFER, THE EAST OHIO GAS COMPANY, CLEVELAND, OHIO.

A test showing that natural gas, filtered through cotton, is just as good as artificial gas for use by dentists for melting gold for all kinds of dental work, and brazing of all kinds.

Take a piece of $\frac{3}{4}''$ pipe, about one foot long, fill it with cotton and let natural gas pass through it. The result will be just as good, if not better, than with artificial gas.

Wrinkle No. 49.

METHOD OF CLEANING MERCURY.

FREDERICK P. DOYLE, ASST. CHIEF ENGINEER, MIDWAY GAS CO., TAFT, CALIFORNIA.

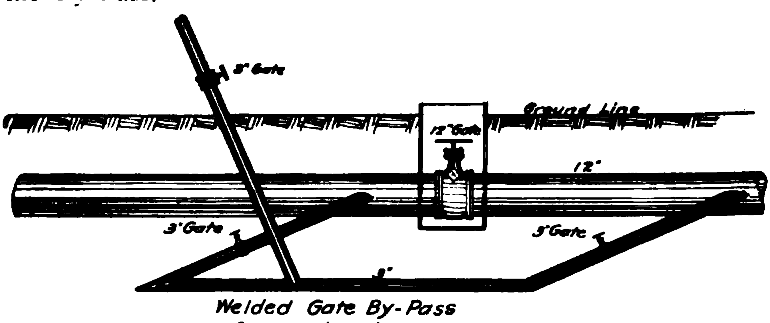
When adjusting an orifice meter gauge, used for measuring casinghead gas, it was found that some oil had been carried over from the main gas line to the chamber containing the mercury. In an attempt to clean the mercury by using water it separated into minute globules each apparently coated with a thin film of oil. After a few washings with gasoline the mercury was thoroughly separated from the oil and the globules immediately united to form one mass of clean mercury putting it in proper shape for use in the gauge and at the same time saving it.

Wrinkle No. 50.

WELDED BY-PASS AROUND GATE VALVE.

H. C. HUTCHINGS, CONSTRUCTION FOREMAN, WICHTA NATURAL GAS CO., BARTLESVILLE, OKLA.

The ordinary gate valve By-Pass is so expensive that this wrinkle was devised. It merely consists of nipples screwed into both sides of any ordinary screw or flanged gate valve and by the use of the Oxy-Acetylene process, welding the By-Pass connections into both nipples and installing a side gate on each connection and completing the By-Pass around the gate. If desired, a blow off nipple with a gate on it can be welded into the By-Pass.



Welded Gate By-Pass for any size pipe

Wrinkle No. 50.

Wrinkle No. 51.

METHOD OF COOLING JACKET WATER FOR A GAS ENGINE.

FREDERICK L. DOYLE, ASST. CHIEF ENGINEER, MIDWAY GAS CO., TAFT, CALIFORNIA.

(See drawing on page 194.)

In localities where water for cooling purposes has to be purchased by the barrel and where it contains a large percentage of scale forming salts the cooling system as shown by the accompanying diagram can be used to advantage.

The system is filled with distilled water or the purest water obtainable. The heated water from the gas engine flows into a tank from which it is pumped to cooling coils partly submerged in the cooling pond and partly exposed to the action of water from sprays. From the coils it goes to the engine and through the cylinder jacket.

If obtainable, salt water from a shallow water well can be used for circulating through the sprays and the cooling pond. There will be a slight evaporation of the water in the system but this method of cooling will not only greatly reduce the amount of good water used but will prevent the engine from being scaled up in a short time.

If used in a gas compressing plant or a gasoline plant the cooling coils can be in the same tower with the coils through which the compressed gas circulates. Allow 25 B. T. U. per hour per square foot of area of cooler coils for cooling effect.

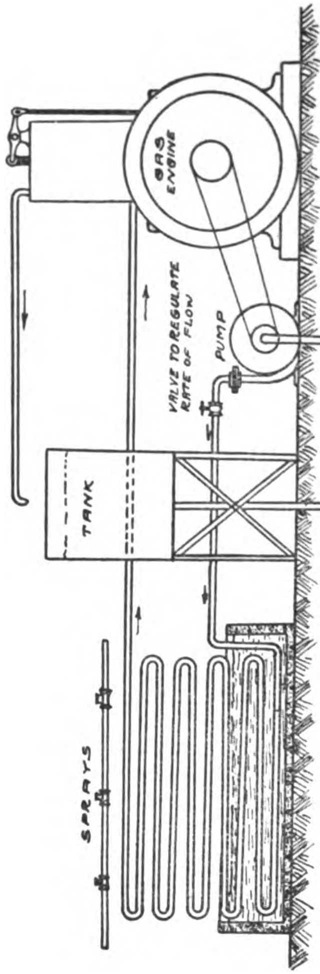
Wrinkle No. 52.

PRINTED NOTICES.

V. A. GOBLE, THE EAST OHIO GAS CO., RAVENNA, OHIO.

Printed notices informing the consumer of violations of Gas Company Rules: that is, hose connections, appliances without flue connections, etc. These notices to be handed out by meter readers, fitters and other employes, when they come in contact with any violations.

Also a printed card from the Gas Company to inform plumbers, pipefitters and contractors, as to the correct size of pipe to run to the last outlet, and also the proper size of risers to the second or upper floors.



METHOD OF COOLING JACKET WATER FOR A GAS ENGINE
Wrinkle No. 51.

Wrinkle No. 53.

LOCATING ACCOUNTS FOR METER READERS.

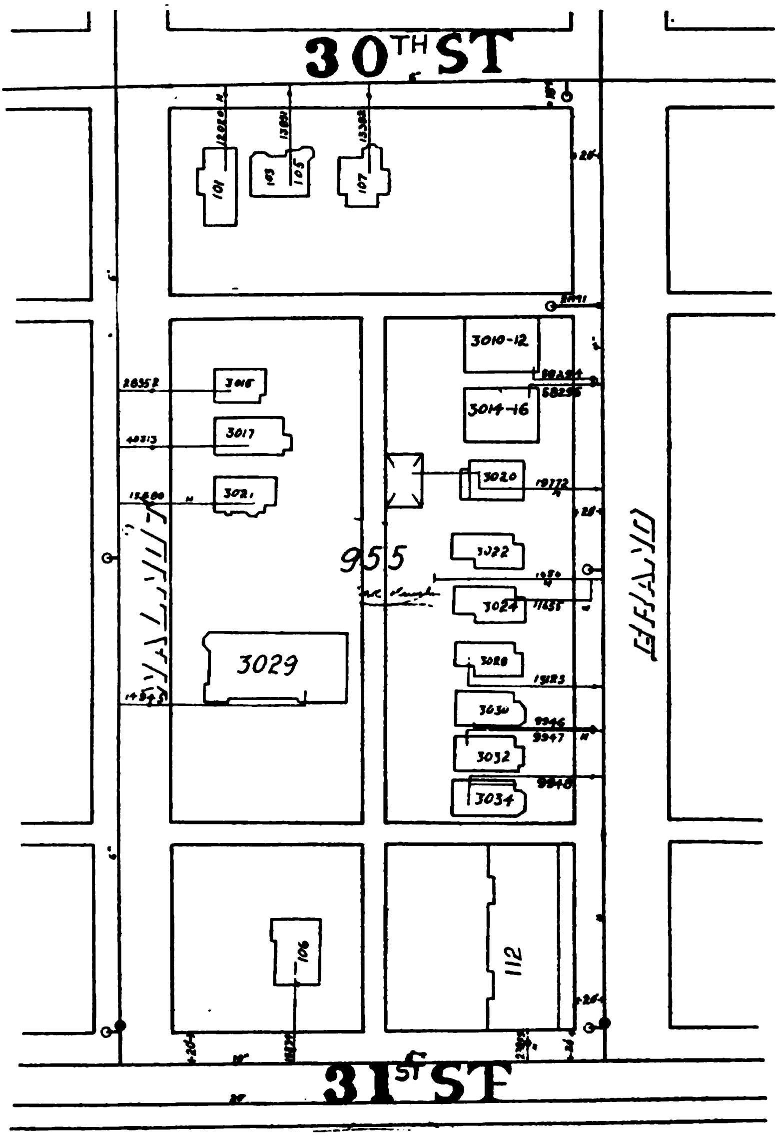
ROBERT W. GOODNOW, ASSESSOR AND COLLECTOR, WATER DEPARTMENT, KANSAS CITY, MO.

The writer, while a member of the National Gas Association of America, is not directly connected with the gas proposition at the present time, but was Gas Inspector for the City of Kansas City for several years. His duties now are Assessing and Collecting Water Rates for the municipally owned water plant of Kansas City, Mo.

A great many splendid ideas can be found in the Wrinkle Department reports which are applicable to Public Service corporations, such as Water and Gas, and I believe that the enclosed sketch of a system which we have adopted to locate our Accounts in our meter readers' Route Books and Meter Rate Ledgers, and while it is not entirely a new idea might be of assistance to some other City or Company, so we are enclosing a sketch of the same and a short explanation regarding its workings.

Wish to state that the City adopted this plan about a year ago and we are finding it to be a much simpler and easier method of locating our accounts than our old method, which was done by giving an Account a Tap number and then a License number, locating the Account by the License number. A brief description of this Block System idea is as follows: We have taken a large map of the City of Kansas City and have numbered every city block: in large tracts of land have left spaces so that additional numbers can be added when the same are platted.

We start in at one corner of this City block and set up our Accounts by street number; the attached drawing being a copy of our service map for block No. 955: we read down one side of the block, then read the cross street number, then read backwards on the named street and back to the point of beginning, viz:



Wrinkle No. 53.

3015 Walnut St.	1006 E. 31st.	3034 Grand.	107 E. 30th St.
3017 Walnut St.	1012 E. 31st.	3032 Grand.	105 E. 30th St.
3021 Walnut St.	then to	3030 Grand.	101 E. 30th St.
3029 Walnut St.		3028 Grand.	
then to		3024 Grand.	
		3022 Grand.	
		3020 Grand.	
		3016 Grand.	
		3012 Grand.	
		then	

If at any time a new service is made anywhere in this block, the Meter Rate Ledger sheet and the Meter Readers' Route sheet is printed on the Addressograph and then put into the Route book and Ledger just where it belongs. The stencil on the Addressograph, Meter Readers' Route book and the Meter Rate Ledger are all set up in this same order. We believe this is better than any Account Number or Tap Number system of locating these Accounts. We certainly find it to be a great advantage in this City.

In thickly settled districts within four City blocks, there are at times as many as 200 water meters, and sometimes even more gas meters. Kansas City has over 60,000 water services; 43,000 approximately are metered services and 3,000 are made up of Public buildings, Flush Tank connections, Fire Protection services, vacant stores and houses, which leaves approximately 14,000 live Flat Rate accounts, and these are houses of under 8 rooms. The reason that we bring out the above is to explain that it is quite a problem to locate readily our Accounts.

Sample of Addressograph Plate.

R. W. GOODNOW,
MAIL TO CITY HALL.

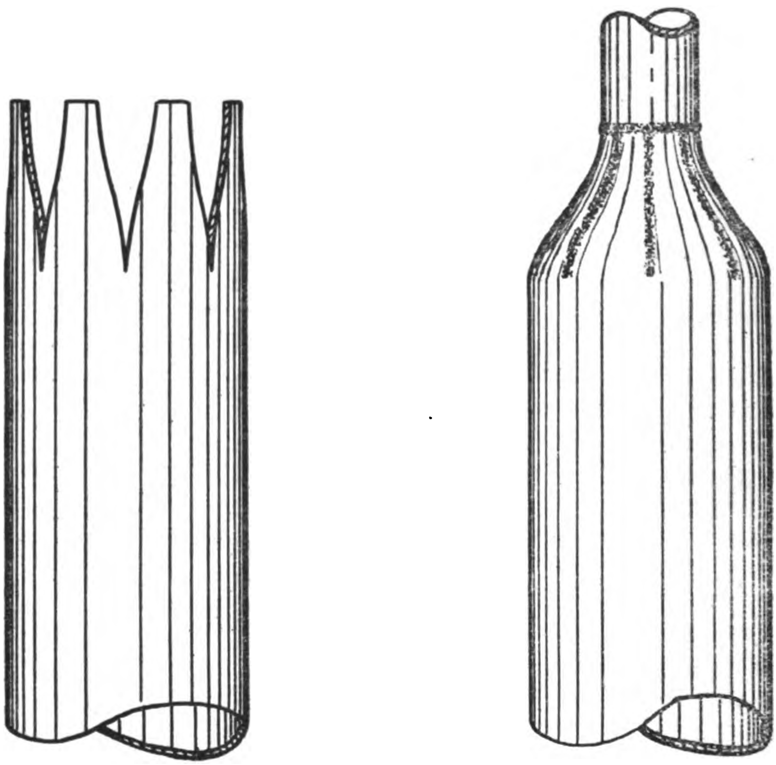
Block No— 785 633 SCHAEFER AVE.,
Tap No— 59444

Wrinkle No. 54.

WELDED SWEDGE NIPPLE.

JOHN FINK, WAREHOUSE CLERK, EMPIRE GAS AND FUEL CO.,
BARTLESVILLE, OKLA.

This wrinkle consists of a piece of scrap pipe, any desired length, which has been cut to the shape of an orange peel with the points of the lips cut off to fit any size pipe wished. After which, it is heated in a forge and the lips are bent into the size pipe desired to swedge to and welded together with the Oxy-Acetylene process.



ORANGE PEEL SWEDGED NIPPLE

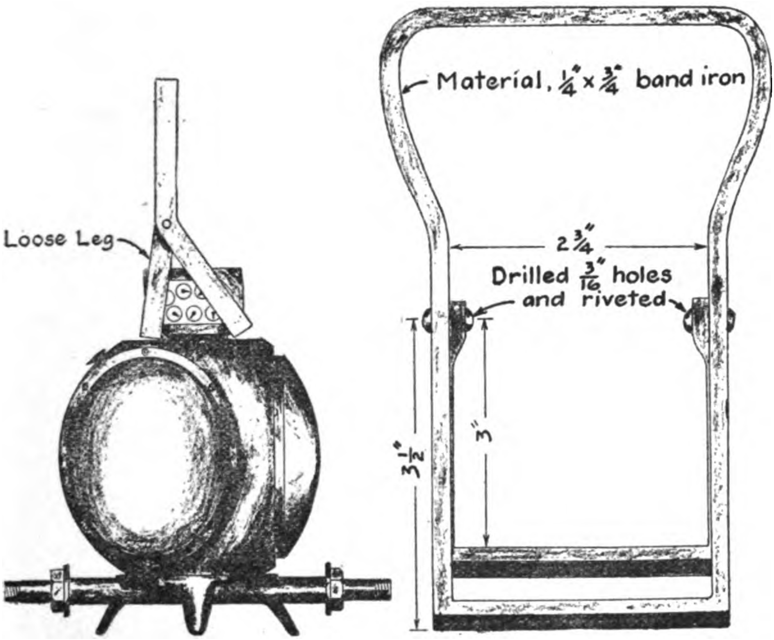
Wrinkle No. 54.

Wrinkle No. 55.

DEVICE FOR CARRYING NO. 1 AND NO. 2 TOBEY METERS.

A. H. FRICKER, THE EAST OHIO GAS CO., YOUNGSTOWN, OHIO.

This device for carrying Tobey Meters is very convenient; it takes a very strong grip on the meter and will prevent a lot of broken glasses.



DEVICE FOR CARRYING TOBEY METERS

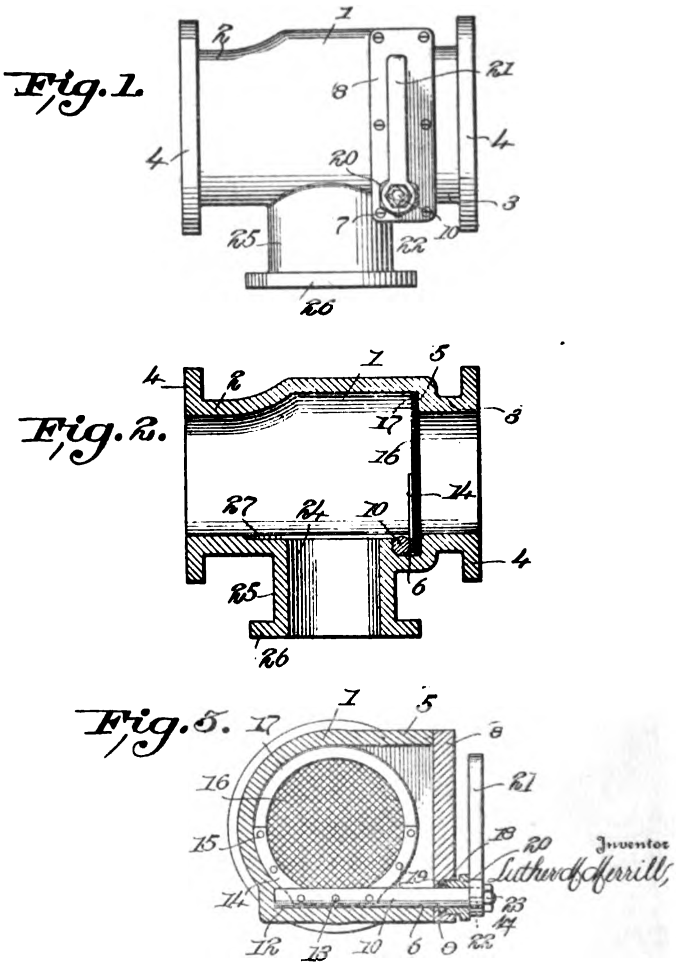
Wrinkle No. 55.

Wrinkle No. 56.

CLEAN THIS SCREEN WITHOUT TOOLS.

L. M. MERRILL, KANSAS NATURAL GAS CO., JOPLIN, MO.

I am enclosing herewith a sketch for a screen device, made by one of our employes. The cut and explanation herewith



Wrinkle No. 56.

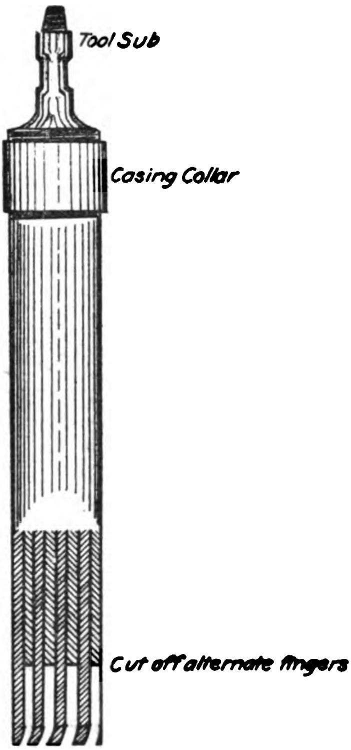
attached will probably give you all the information you would wish, but will state that the device is arranged that for cleaning the screen in front of the regulator or pipe line necessitates no tools whatever, being put in with a side gate and the lever shown on the side will throw the screen in such a position that the gas itself will clean the screen. One other advantage in

regard to the device is that it can be put inside of a building and a pipe run out of the building so as to carry the gas away from any danger when cleaning the screen and it does not necessitate shutting of the supply of gas at any time. I took notice of one of the wrinkles of last year a device for screens and I thought this much superior to it that you might want to use it as a wrinkle.

Wrinkle No. 57.

UNDERREAMER FISHING TOOL.

G. J. MCKINLEY, FIELD SUPERINTENDENT, EMPIRE GAS AND FUEL CO., EL DORADO, KAN.



TOOL FOR FISHING UNDER REAMER SLIPS

Wrinkle No. 57.

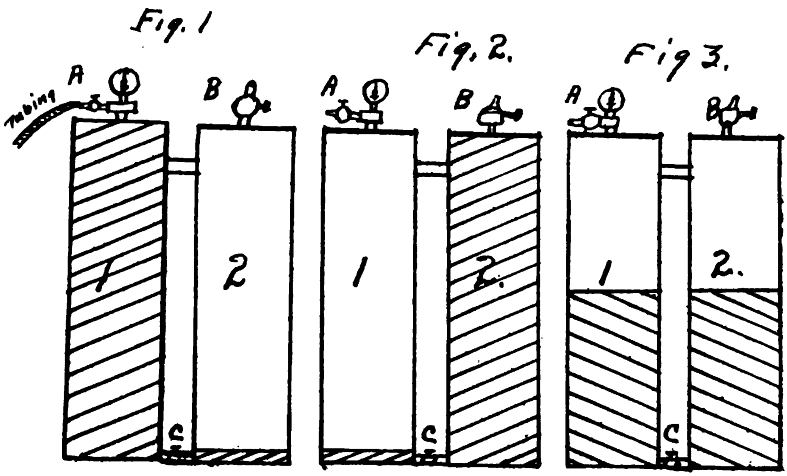
This tool consists of a joint of casing 4 or 5 ft. in length, any desired size, with the casing collar on top, to which a tool sub can be screwed. The bottom end is cut into fingers 18″ long, with 8″ of each alternating finger cut off. The bottom of the extended fingers are cut in such a curve that when driven onto the bottom of the hole, they will curve to the center, forming a basket around the under reamer slip. This is also used effectively when pieces of bit are broken off.

Wrinkle No. 58.

METHOD OF TESTING GAS FOR GASOLINE.

SUBMITTED WITHOUT NAME OF CONTRIBUTOR.

Fill tank No. 1 with Claroline Oil and have connection at bottom of tank No. 2 just covered.



Wrinkle No. 58.

Open all pet-cocks and blow in B until oil appears at A. Close A and C and pour off excess oil in tank No. 2, leaving just enough to cover connection at bottom. Connect rubber tubing with gas to be tested. Open A, B and C, admitting gas on top of oil in tank No. 1. When oil appears at B, close A and B. Now connect hand pump at B and put 25-pound

pressure on top of oil in tank No. 2. Next close C, and agitate. Note reading of gage.

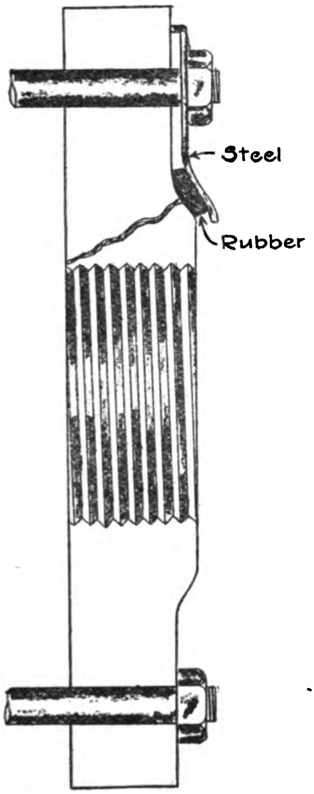
$$\frac{\text{Initial gage pressure} + 14.7}{\text{Final gage pressure} + 14.7} = \%\ \text{of gas not absorbed.}$$

NOTE. — Tanks are filled originally with Claroline Oil by removing pet cock B and filling tank No. 2 by means of funnel.

Wrinkle No. 59.

STOPPING A SAND-HOLE LEAK IN A 16-INCH GATE FLANGE.

J. SULLIVAN, THE EAST OHIO GAS COMPANY, CLEVELAND, OHIO.



CROSS SECTION
Wrinkle No. 59.

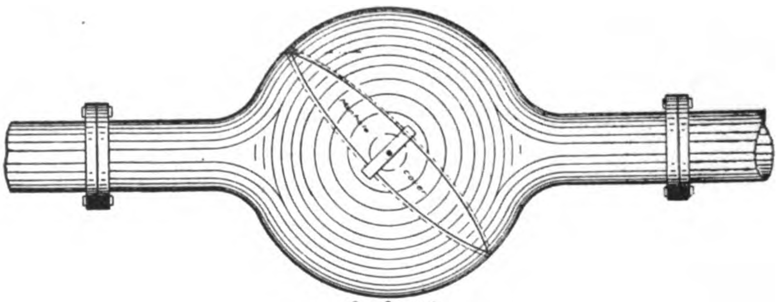
This interesting wrinkle was accomplished about four years ago. The leak developed from a sand hole on the flange of a 16″ gate. It was not feasible to remove the gate, so a steel plate was formed long enough to include two of the bolt holes on the face of the flange, and formed as shown on the cross section. The surface of the flange where a strip of soft rubber was placed, received a heavy coat of shellac. It has never required any attention since it was put on.

Wrinkle No. 60.

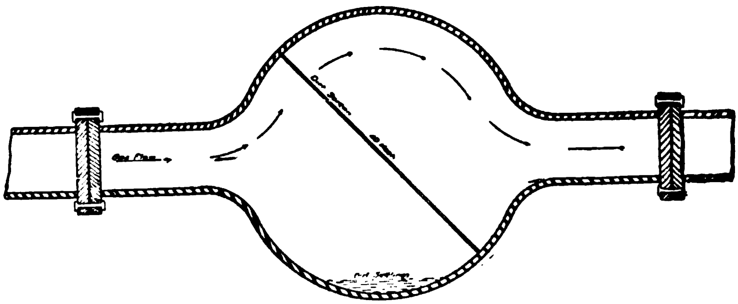
A DIRT TRAP.

CHAS. L. BULLOCK, SUPERINTENDENT DISTRIBUTION,
BARTLESVILLE, OKLA.

This dirt trap is being used with great success, being the first connection off of the main line. The screen is set at an



GAS CLEANER



LONGITUDINAL SECTION.

Wrinkle No. 60.

angle of 45 degrees, and the gas coming in horizontally the dirt strikes this 45 degree screen and instead of passing through is deflected and drops to the bottom. The opening to remove the screen is a simple hand hole plate with one bolt. In changing the screen only one nut has to be removed, a blank is shoved in to replace the screen, the gas turned on for a second and instantly blows all of the dirt out of the bottom of the cleaner, then the blank is taken out, a new screen inserted, the nut screwed onto the bolt, which requires only a few seconds of time, when the service is again resumed.

This little dirt catcher saves a great deal of meter and regulator cleaning, and pays for itself many times during a year's service.

Wrinkle No. 61.

METER HOUSE HEATER.

W. J. HINCHEY, INSPECTOR, KANSAS NATURAL GAS CO., PITTSBURG, KANSAS.

The drawing on page 206 shows a heater used for meter or regulator station. I believe the drawing needs no explanation.

Wrinkle No. 62.

ORIFICE TESTER AND TABLES.

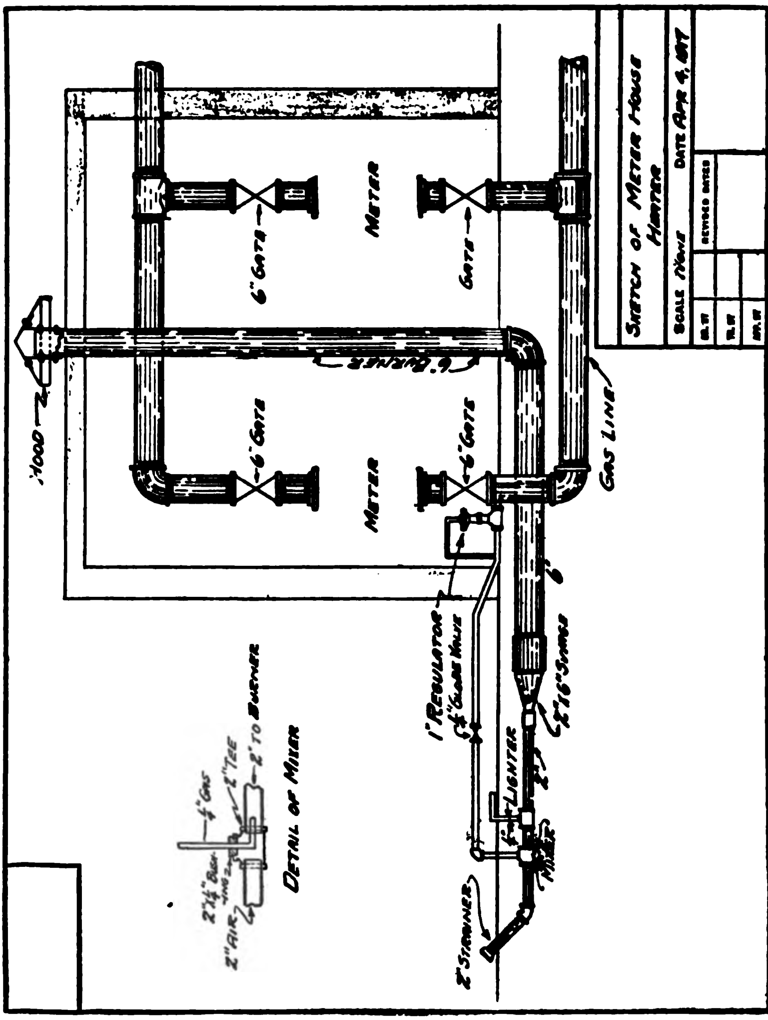
E. O. HICKSTEIN, BARNSDALL OIL COMPANY, BARTLESVILLE, OKLA.

(See drawing on page 207.)

The sketch submitted shows an orifice tester of the type generally used in gauging the flow of gas from the casing-head of an oil well.

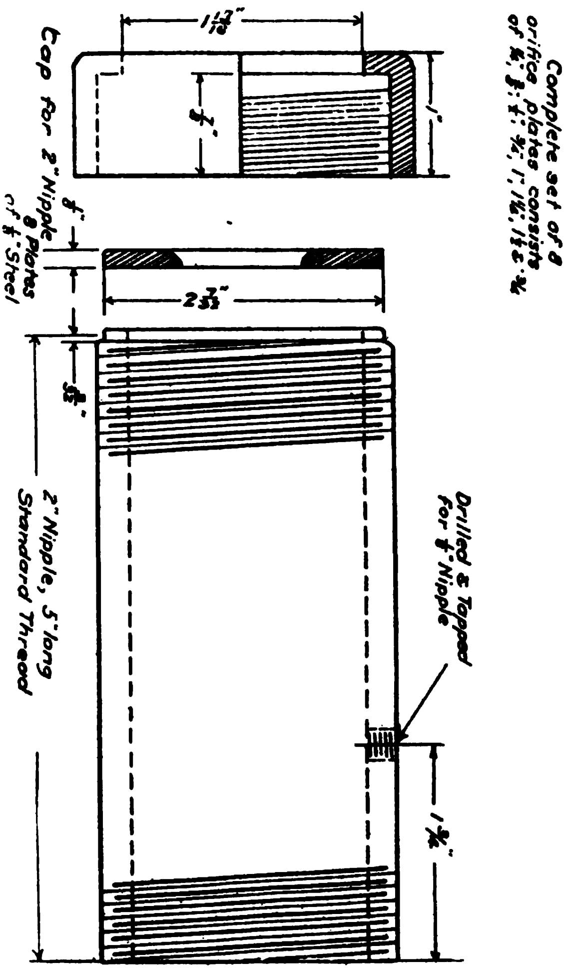
Herewith are two tables to be used in connection with tester. While the design used is not original, the tables are the result of actual calibration of a tester against a five-foot meter prover. Tests were made by F. P. Zoch, of Pittsburgh, Pennsylvania, and the writer.

A number of tables similar to the one herewith submitted are in circulation. It was on account of the fact that wide variations existed between the different tables that the calibration tests on this instrument were made.

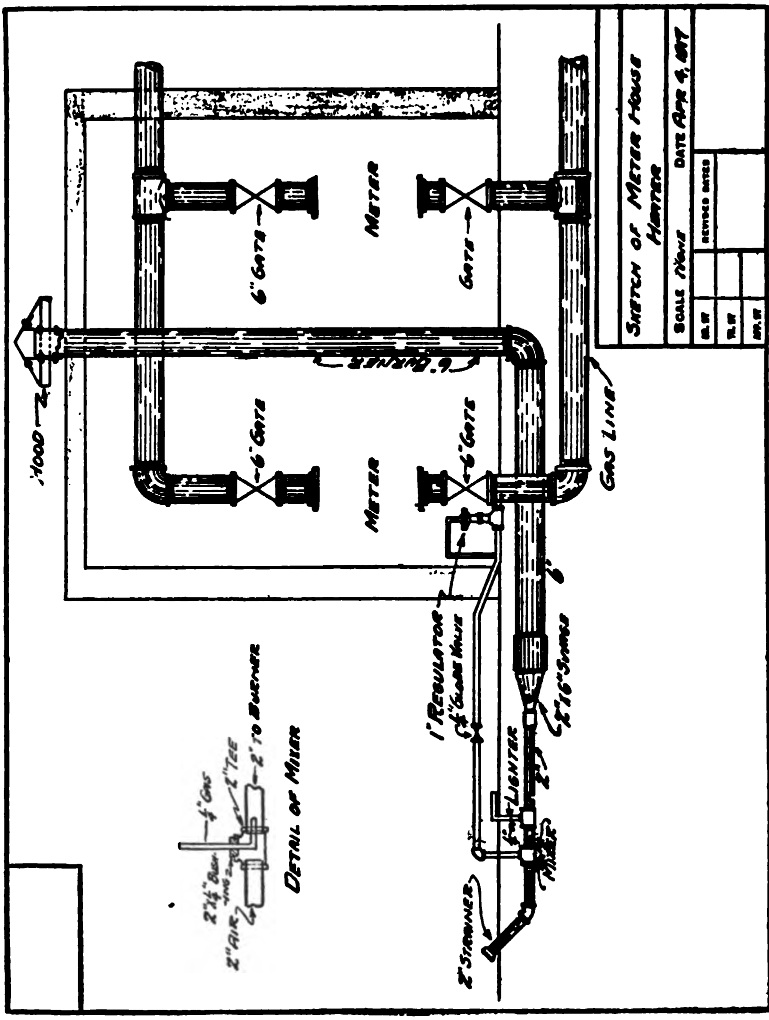


Wrinkle No. 61.

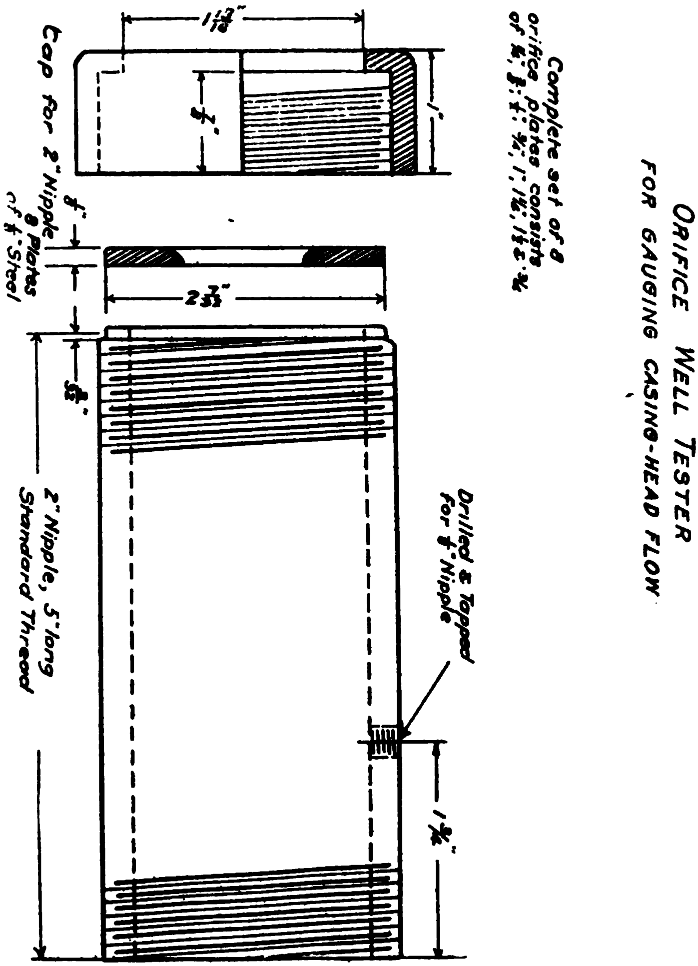
ORIFICE WELL TESTER
FOR GAUGING CASING-HEAD FLOW



Wrinkle No. 62.



Wrinkle No. 61.



Wrinkle No. 62.

The writer has also found the tester useful in the checking of meters and of the displacement of vacuum pumps.

The tables are believed to be accurate within two per cent.

An ordinary two-inch nipple of the proper length can be used. The writer prefers using a piece of an old steel working barrel, on account of its better appearance. The small plates with the orifices machined in are one-eighth inch in thickness, and had probably better be made of steel. The bevel on the orifice faces the outside, as shown on sketch.

The complete outfit can be made by almost any machine shop at a cost of approximately ten dollars — a considerable saving. The orifices should be accurately machined to diameter.

In using this type of tester it is well to note the following points:

(1) The largest orifice that gives a readable pressure — say 1″ of water or over — should be used, thus avoiding back pressure.

(2) It is necessary to allow sufficient time for the gas inside the casing to build up to a steady pressure.

(3) A knowledge of the gravity of the gas is always required for an accurate gauge.

(4) The table is not to be used with testers of design other than shown.

CAPACITIES OF SMALL ORIFICES.

For Testing Casing-Head Gas Wells.

(See Wrinkle No. 62.)

Capacities given in cubic feet of 8 oz. Gas, (Gravity 1.00) per twenty-four hours.

To correct to gravities other than 1.00, use correction factor given in Table.

Inches Water	SIZE OF ORIFICES							
	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"
0.5	980	2,210	3,950	9,000	16,360	26,600	40,900	60,650
0.6	1,070	2,420	4,320	9,870	17,920	29,050	44,300	66,550
0.7	1,160	2,620	4,670	10,620	19,360	31,400	48,400	71,900
0.8	1,240	2,790	4,980	11,350	20,620	33,550	51,550	76,650
0.9	1,310	2,950	5,270	12,010	21,840	35,500	54,600	81,100
1.0	1,380	3,110	5,550	12,690	23,040	37,450	57,600	85,700
1.1	1,450	3,270	5,840	13,310	24,200	39,300	60,500	90,000
1.2	1,510	3,410	6,100	13,890	25,240	41,000	63,100	93,900
1.3	1,570	3,550	6,340	14,460	26,300	42,700	65,750	97,700
1.4	1,630	3,690	6,580	14,990	27,260	44,300	68,150	101,000
1.5	1,690	3,810	6,810	15,520	28,220	45,900	70,550	104,800
1.6	1,750	3,940	7,030	16,020	29,160	47,400	72,900	108,000
1.7	1,810	4,050	7,250	16,510	30,060	48,900	75,150	111,300
1.8	1,860	4,170	7,450	17,000	30,940	50,300	77,350	114,600
1.9	1,910	4,300	7,660	17,490	31,780	51,600	79,450	117,800
2.0	1,960	4,410	7,860	17,970	32,620	53,000	81,550	121,000
2.1	2,010	4,510	8,060	18,410	33,420	54,400	83,550	123,950
2.2	2,050	4,620	8,260	18,820	34,220	55,600	85,500	126,900
2.3	2,100	4,730	8,450	19,250	35,000	56,900	87,500	129,850
2.4	2,140	4,830	8,630	19,640	35,760	58,100	89,400	132,400
2.5	2,190	4,930	8,800	20,040	36,500	59,200	91,250	135,200
2.6	2,230	5,030	8,960	20,450	37,200	60,400	93,000	138,000
2.7	2,270	5,120	9,130	20,850	37,900	61,500	94,750	140,600
2.8	2,310	5,220	9,310	21,250	38,600	62,700	96,500	143,200
2.9	2,360	5,310	9,480	21,600	39,300	63,800	98,250	145,800
3.0	2,400	5,400	9,650	22,000	40,000	65,000	100,000	148,100
3.25	2,490	5,610	10,050	22,850	41,600	67,500	103,900	154,100
3.5	2,590	5,820	10,400	23,700	43,200	70,000	107,800	160,100
3.75	2,680	6,030	10,760	24,550	44,700	72,500	111,700	165,900
4.0	2,770	6,240	11,120	25,350	46,200	74,900	115,200	171.400

CORRECTION FACTORS FOR GRAVITIES.

To be Used with Table of Capacities of Small Orifices.

Gravity.	Multiplying Factor.	Gravity.	Multiplying Factor.
.70	1.195	1.00	1.000
.71	1.187	1.01	.995
.72	1.178	1.02	.990
.73	1.170	1.03	.985
.74	1.162	1.04	.981
.75	1.155	1.05	.976
.76	1.147	1.06	.971
.77	1.140	1.07	.967
.78	1.132	1.08	.962
.79	1.125	1.09	.958
.80	1.118	1.10	.954
.81	1.111	1.11	.949
.82	1.104	1.12	.945
.83	1.098	1.13	.941
.84	1.091	1.14	.937
.85	1.085	1.15	.933
.86	1.078	1.16	.929
.87	1.072	1.17	.925
.88	1.066	1.18	.921
.89	1.060	1.19	.917
.90	1.054	1.20	.913
.91	1.048	1.21	.909
.92	1.043	1.22	.905
.93	1.037	1.23	.902
.94	1.032	1.24	.898
.95	1.026	1.25	.895
.96	1.021	1.26	.891
.97	1.015	1.27	.887
.98	1.010	1.28	.884
.99	1.005	1.29	.881
		1.30	.877

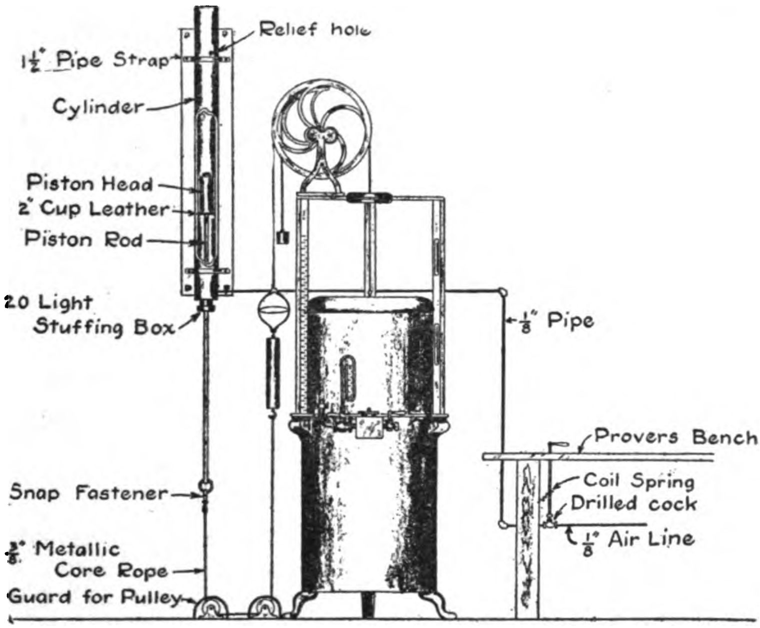
Wrinkle No. 63.

DEVICE FOR RAISING METER PROVER BY AIR.

A. H. FRICKER, THE EAST OHIO GAS COMPANY, YOUNGSTOWN, OHIO.

This arrangement saves time and labor, for the man using it can work prover much faster than pulling it up by hand.

It is not expensive to make; the cylinder consists of 2″



DEVICE FOR PULLING UP METER PROVER

Wrinkle No. 63.

brass tubing, and piston is made of 1½″ lead pipe swedged out to fit the inside of the cylinder. The lead pipe is filled with lead and drilled through the center. This gives the piston enough weight to make the return for another pull. The piston rod is 5/16″ steel, polished to prevent friction in the stuffing box. The leather is of common 2″ cup leather, such as used in test pumps.

The valve is placed below the prover's bench, as shown on the air line and an extension rod to extend up through the bench with the handle on top of same. The valve is drilled through the side in such a manner that when opened the air enters the bottom of the cylinder and when closed, permits the air to escape through the drilled hole.

A spiral spring is attached to the extension rod under the bench to shut valve off when handle is released; this spring prevents possible opening of valve by accident, unless the prover wishes to do so.

The cylinder should be about 10" longer than the scale on the prover. A hole is drilled near the top of cylinder so that when piston is raised high enough to pull prover up to its limit, it will be above this relief hole, thus permitting the air to escape below the leather from the cylinder.

Wrinkle No. 64.

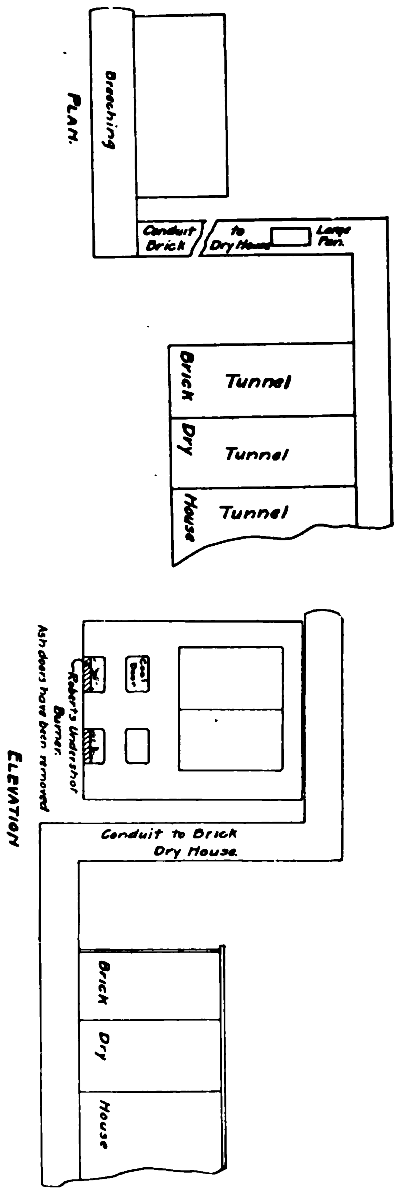
METHOD OF USING HOT FLUE GASES TO DRY BRICK.

W. T. ROBERTS, C. W. CRAMER, ENGINEERING DEPARTMENT, ARKANSAS NATURAL GAS COMPANY, LITTLE ROCK, ARKANSAS.

(See drawing on page 213.)

Four, 125 H. P., return flue, boilers have their breechings connected in one conduit, leading to the brick dry house. In conduit is placed a large fan which creates the necessary draft and forces the hot gases into the drying tunnels. This method is an efficient fuel saver.

To Mr. W. W. Dickinson, Jr., of Little Rock, Arkansas, must be given the credit for the above installation.



Method to Utilize Hot Flue Gases to Dry Brick.

Wrinkle No. 64.

Wrinkle No. 65.

METHOD TO PREVENT USE OF UN-REGISTERED GAS BY TIPPING.

G. C. REED, TELEPHONE FOREMAN AND METER INSPECTOR, LONE STAR GAS COMPANY, FORT WORTH, TEXAS.

Figure "A" shows post with slot in which valve stem works, as in present usage.

A

B

Wrinkle No. 65.

Figure "B" shows post with circular hole instead of slot This hole would confine valve stem in such a manner that stem would have no upward and downward play if meter were tipped.

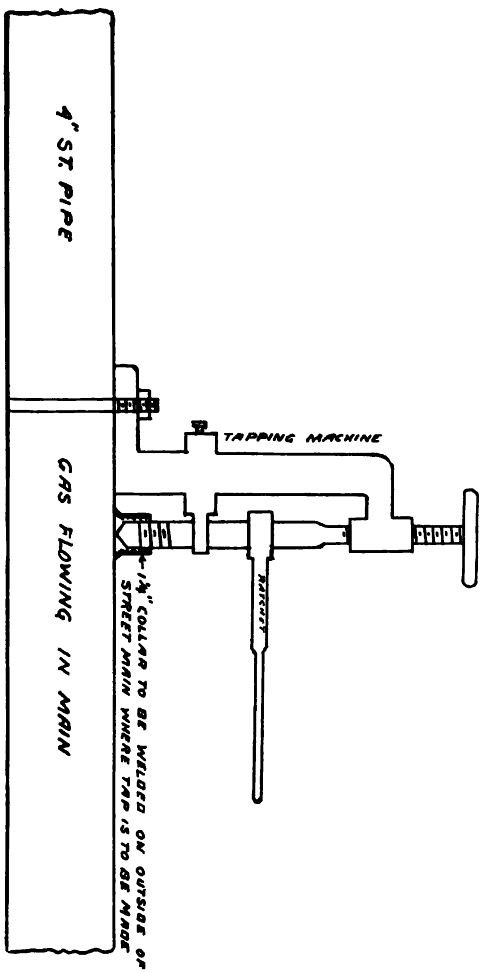
Wrinkle No. 66.

WELDING TAP WITHOUT SHUTTING OFF GAS.

L. B. BENSON, BARTLESVILLE, OKLAHOMA.

(Drawing on page 215.)

A 1″ or 1¼″ tap can be welded on a street main with the gas on by welding a coupling of the size pipe to be used onto the main, then tapping a hole through the coupling as shown in the cut, removing the tap and screwing in the plug until ready for the service connection. This saves a saddle and two street ells.



WELDING TAP FOR SERVICE LINE WITHOUT SHOTTINGOFF GAS

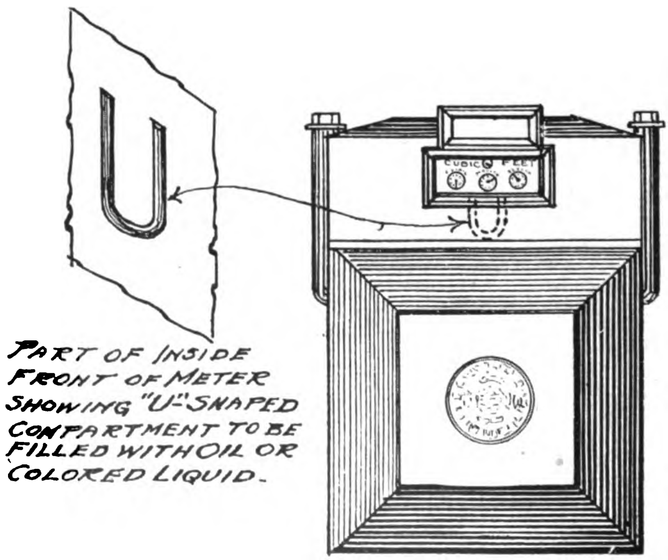
Wrinkle No. 66.

Wrinkle No. 67.

METHOD TO DETECT WHETHER METER HAS BEEN TIPPED AND GAS NOT REGISTERED.

G. C. REED, TELEPHONE FOREMAN AND METER INSPECTOR, LONE STAR GAS COMPANY, FORT WORTH, TEXAS.

If a meter equipped with this device is tipped, the oil or colored liquid in the "U" shaped compartment would spill onto dial and stain same.



Wrinkle No. 67.

Wrinkle No. 68.

THREE-IN-ONE WRINKLE THAT HELPS IN JOPLIN.

B. J. CRAHAN, SUPT., JOPLIN GAS CO., JOPLIN, MISSOURI.

We submit for your approval exhibits No. 1, No. 2, and No. 3.

EXPLANATION AS TO EXHIBIT NO. 1.

This is a gas ledger index made of blackboard cloth, size 28″ x 28″, which we find to be a great help to our ledger keepers. It increases rapidity in looking up accounts.

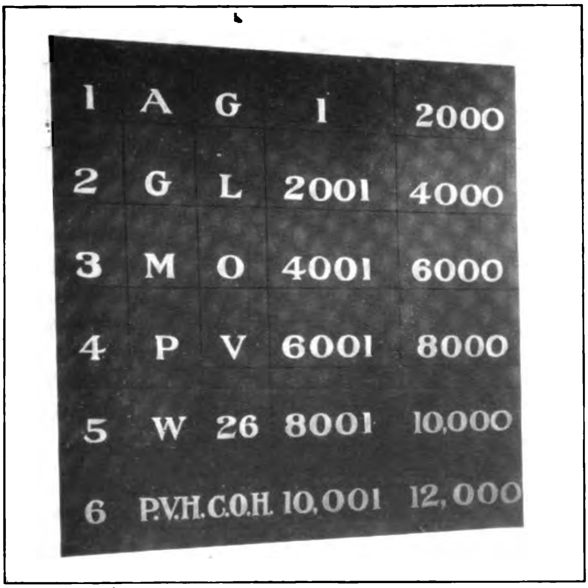


Exhibit No. 1.

EXPLANATION AS TO EXHIBIT NO. 2.

No. 2 will give you the outline of method employed in having a small station made in number to correspond with the ledger number. This station number follows the ledger to the different desks so that during the discount period from the first to tenth

of the month the teller in waiting on the customer is able to tell from the index at a glance the number of the ledger, then the station is a guide to the desk where ledger is located which is a great time saver during the busy days of the month which all helps to relieve the congestion in our office during this period.

Exhibit No. 2.

EXPLANATION AS TO EXHIBIT NO. 3.

This is a sorting box made of tin with twelve compartments which facilitates the sorting of coupons very materially and needs no explanation.

Through assistance of the three simple devices the Joplin Gas Company have made a very material saving of time for the office employees during the busy days and as we make about 90% of our collections during the first ten days of the month we would hardly be able to get along with the present office facilities should we discard the three devices herein listed.

Permit me to say further that our ledgers are arranged in

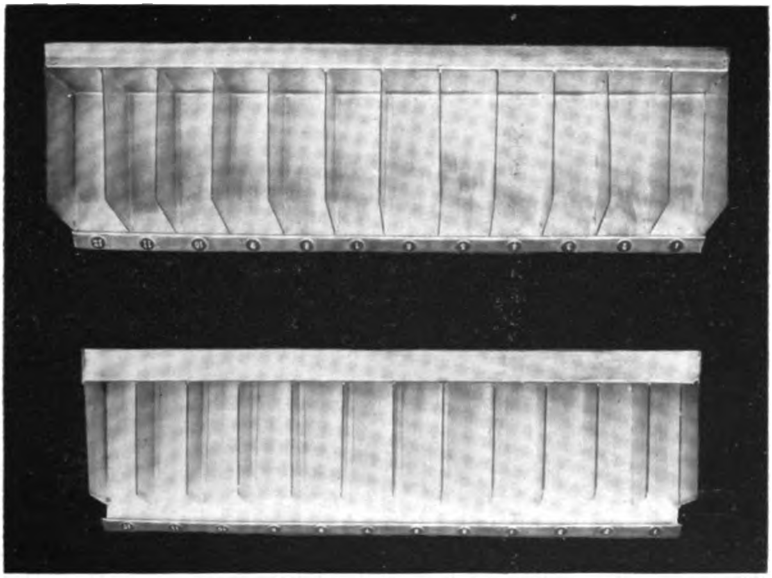


Exhibit No. 3.

alphabetical order with reference to the streets running parallel one way and indexing in numerical order with the cross streets running parallel.

Wrinkle No. 69.

FLASH LIGHT BATTERIES.

MR. A. H. FRICKER, THE EAST OHIO GAS CO., YOUNGSTOWN, OHIO.

For a Five-Cell light, use a 5.3 Volt bulb and when same commences to get dim, use a 3.8 Volt bulb until battery is played out. For Three-Cell light, after bulb becomes dim, use the same size bulb as that used in a Two-Cell light. Use a little judgment as to the proper time to change bulbs to prevent breaking same.

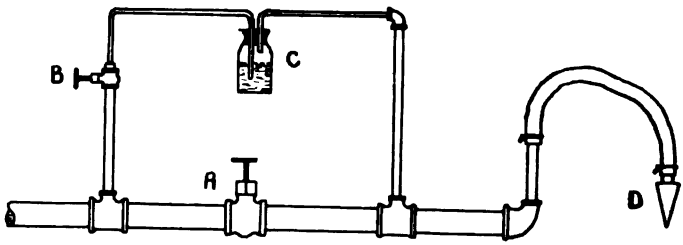
This amount will give double the ordinary amount of service from your batteries.

Wrinkle No. 70.

DEVICE FOR TESTING TOPS OF METERS.

J. R. GILBERT, 1012 BOIS DARC STREET, FT. WORTH, TEXAS.

This device consists of a by-pass through a bottle of water and a hose and a funnel connection. To operate: punch small hole in the top of the meter to be tested and insert funnel (D); apply pressure, close main valve (A) and open by-pass valve (B) If the meter top leaks, bubbles will pass through bottle (C).



Wrinkle No. 70.

Wrinkle No. 71.

THERMOMETER HOLDER.

J. R. GILBERT, 1012 BOIS DARC STR., FT. WORTH, TEXAS.

(Drawing on page 221.)

Reducer soldered to meter connection gives a useful device for holding the thermometer. This gives the correct temperature of the gas passing through the meter while a test is being run.

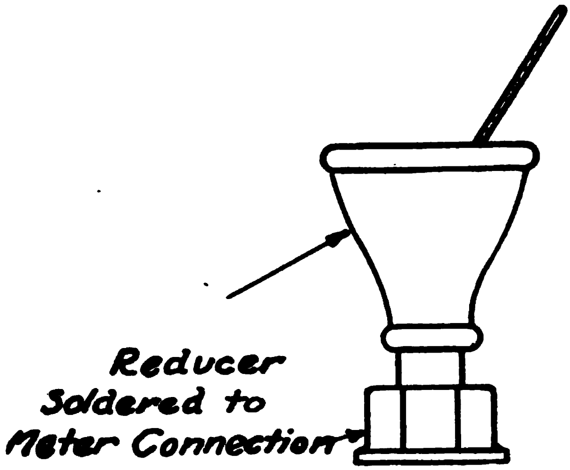
Wrinkle No. 72.

METHOD OF REPAIRING AND STRAIGHTENING PISTON SLEEVE.

J. A. REMLER, KANSAS NATURAL GAS CO., INDEPENDENCE, KANSAS.

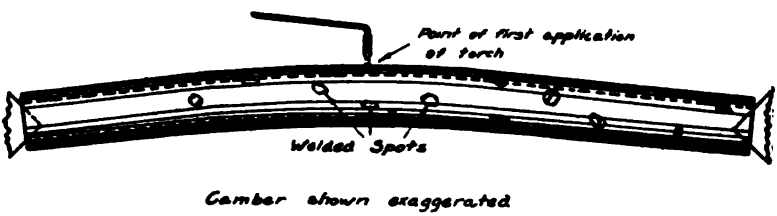
(Drawing on page 221.)

We have on our Gas Engines piston sleeves that slip over the piston rods and are spaced between the piston heads. The longest of these are 13′ 11½″ and each engine has two of this length, for the purpose of water circulation to pass around piston and heads. The outside diameter comes in contact with metallic packing rings.



THERMOMETER HOLDER

Wrinkle No. 71.



METHOD OF STRAIGHTENING PISTON SLEEVE
SLEEVE SWUNG ON LATHE CENTERS

Wrinkle No. 72.

We have been having these steel castings made in the rough and we finish them. In the course of finishing we have found them to be badly spotted with sand holes.

We roughed them down within $^1/_{16}''$ of finishing size and when we put the water test on found them leaking badly and we were at a loss to know what to do with them but decided to use an ascetylene welding machine.

These sand spots are streaked and spongy and the blow torch would not do a satisfactory job of welding, so we chipped out as much of the sand as possible and welded it with a welding machine. One of these sleeves had over forty bad spots which were welded in and after completely welding it was found to be sprung ⅞" out of true. The question came up how to straighten it and we had in mind the usual way which would have been much more expensive.

In order to straighten this piston sleeve the sleeve was swung in the lathe with the cambered side up and the welding torch applied at the point of greatest deflection on the cambered side, not allowing the torch to remain long enough to melt the metal, but bringing it to a good red heat, working the torch back and forth around the sleeve for a distance of about four inches and just the width of the torch blaze. Then applying water to bring the sleeve to an even temperature. This same process was repeated on all cambered points and kinks until the sleeve was absolutely true.

This process is directly opposite to pening and it is the severe, instantaneous heat on one particular spot.

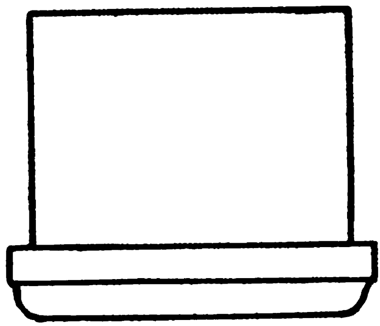
This is valuable information because it can be used in various mechanical work and can be applied to any hollow piston rod or solid shafting. For instance, large diameter crank shafts that may be sprung can be brought back true by following this method.

This will be found valuable to any concern having much machinery to operate, particularly, when having a machine shop in connection. However, the most skilled part of this process is a practical machinist who understands just where and how long to apply the torch.

Wrinkle No. 73.

DIPPING POT FOR SOLDERING IRONS.

J. R. GILBERT, 1012 BOIS DARC STR., FT. WORTH, TEXAS.



DIPPING POT FOR SOLDERING IRONS

Wrinkle No. 73.

A short piece of eight-inch pipe with cap attached makes an indestructible dipping pot for soldering irons.

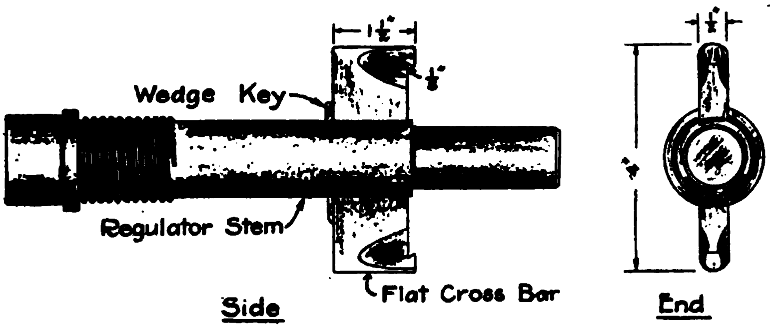
Wrinkle No. 74.

EASY METHOD OF REPLACING RUBBERS IN LOW PRESSURE REGULATORS.

C. R. JONES, THE EAST OHIO GAS CO., CLEVELAND, OHIO.

This Wrinkle is valuable for regulators of 6″ and up, with side plate. It consists of an old regulator connecting stem with the thread at bottom valve nut sawed off. A slot is cut into stem at the position shown, a flat cross bar made to insert in slot and a wedge driven in to hold cross bar securely. This flat bar is notched and filed to such form at the ends, to permit them to mesh with the guide extensions. The top of regulator is removed in the usual manner, bottom valve nut removed, and regular stem taken out.

Turn lower valve over. Take hold of same on bottom with pipe wrench, allowing the wrench to brace against the side of hole to serve as a "back-up." Place stem into valve in such a manner that the notched bar will mesh with the guides, then



Wrinkle No. 74.

take hold of the stem at top with pipe wrench and turn same; thus removing guides, and allowing the replacement of the rubber.

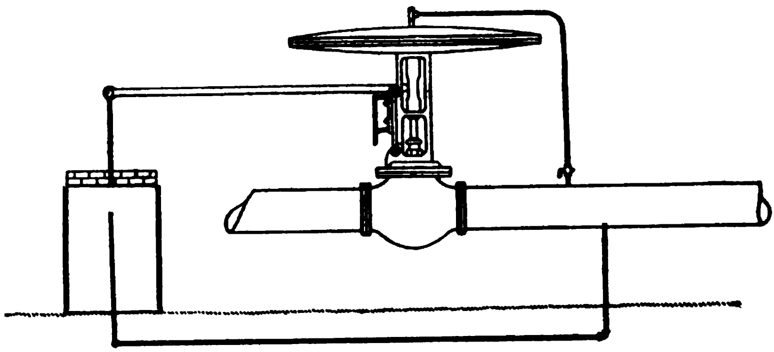
This Wrinkle has saved us considerable time in making these repairs.

Wrinkle No. 75.

GASOMETER IN CONNECTION WITH REGULATOR.

CHAS. L. BULLOCK, SUPT. DISTRIBUTION, BARTLESVILLE, OKLA.

In towns where a large amount of gas is used there has been more or less trouble, when the gas is discontinued for the night by consumers, which sticks the valve in the regulator to such an extent that when the big demand comes on in the morning hours the consumers experience more or less low pressure, and the gauge at the gas office will show a drop in pressure at this time. In some instances it has been necessary for the gas man to go out and push down on the lever of the domestic regulator. By setting this little device, which is a gasometer, putting about 100 pounds of weight on the gasometer, the instant



Wrinkle No. 75.

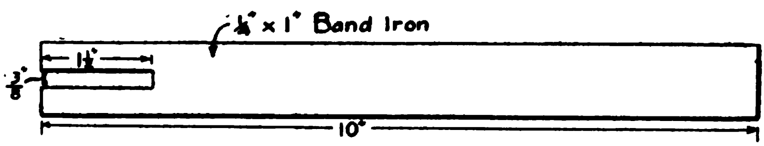
the pressure decreases the hundred pound weight will instantly open the valve, and makes the regulator more sensitive and stops the fluctuations of pressure in the domestic mains.

Wrinkle No. 76.

SAFETY-FIRST METER SHUT-OFF WRENCH.

V. O. GOBLE, THE EAST OHIO GAS CO., RAVENNA, OHIO.

Provide a wrench as shown, made of ¼" iron and give one to each consumer. This wrench to be kept at the meter at all times to shut off the gas in case of emergency.



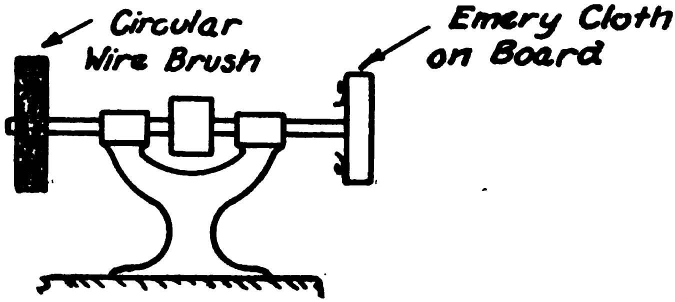
METER SHUT-OFF WRENCH

Wrinkle No. 76.

Wrinkle No. 77.

VALVE GRINDER FOR TOBEY METERS.

J. R. GILBERT, 1012 BOIS DARC STR., FT. WORTH, TEXAS.



Wrinkle No. 79. Wrinkle No. 77.

A piece of board covered with emery cloth and revolved by a power attachment makes a cheap grinder for valves and valve seats of tobey meters.

See also Wrinkle No. 79.

Wrinkle No. 78.

SUGGESTED USES FOR THE METER ORDER.

MAURICE J. ADAMS, FORT WORTH GAS CO., FORT WORTH, TEXAS.

When properly used, the original order to connect or disconnect a meter may be made the basis for a number of operations both in office and shop. This means a saving of a considerable amount of time lost in transcribing information contained on the order to other records. As records vary with different companies and systems differ according to whether number of consumers be many or few, no one outline can be given to cover all cases, but some definite routine should be worked out to fit individual needs along the line of the suggestions following.

SUGGESTIVE OUTLINE.

All orders should be numbered consecutively, should contain space for name, address and remarks. A column should be

provided on the left for meters connected and one on the right for meters disconnected, with ruling to show number, make, and size, as well as state of the meter. Lines at the bottom of the order should provide space for entering folio and line in consumer's ledger on which entry is made as well as folio in meter index in which meter location is recorded. Such a form would appear somewhat like this:

BLANK GAS COMPANY

Blankeville, ... 191... No. 13702

CONNECT METER	DISCONNECT METER
For	For ....
.... Street	.... Street
Deposit No. .... Amt........	
Connected Meter No...........	Disconnected Meter No........
Kind	Kind ....
State	State ....
Date	Date ....
.... Fitter	.... Fitter
Entered Ledger, folio.. line...	Entered Ledger, folio.. line...
Entered Meter Index, folio....	Entered Meter Index, folio....

Wrinkle No. 78.

After order is filled out from application at office, it should go to the operating department and be distributed to the various fitters according to sections of the city covered by them. After order is completed by the fitter it is returned to the shop. In case any shop records are kept, this would be the proper time to make the entries in them. If none are kept, the order is returned at once to the office.

Here the orders are distributed to the clerks having charge of the various consumers' ledgers. A street index to the ledgers will facilitate this distribution. Entries are then made in the ledgers and folio and line notations made on order in space provided for that purpose. In case a disconnect order is entered for a person moving to some other address on the ledgers, the debit or credit balance remaining should be noted on the reverse thereof to be transferred to the new account later.

In case an addressing machine and equipment are used the orders should then go to the clerk attending to that feature in order that new addresses may be set up and "dead" ones be discarded.

The orders should then be arranged in order according to meter number and entered in the meter index. States at which meters are set should be carefully checked against the disconnect state at last address in order that any errors in reading the meters may be detected. Folio of meter index should be noted on the order in the space provided.

After being entered in the meter index, the orders should be separated into three classes. Connect orders covering new consumers should be put in one division, disconnect orders covering consumers lost in a second, and both connects and disconnects covering persons changing meters from one address to another in a third.

Where meter deposits are required, they should be written on the connect order from the application at the time the order is first issued. These connect orders should now be arranged in order according to folio and line of the ledgers and entered therein. In order that all deposits may be entered, it is well to keep a consecutive list of the deposit numbers and check each deposit off as it is entered.

Connects and disconnects covering persons changing addresses are then sorted according to the order number. This will bring the connect and disconnect for each party together and they should be paired off and fastened together with some temporary paper fastener. The debit or credit balances noted on the reverse side of the disconnect should then be entered in

a journal for that purpose crediting the account in full at the old address and debiting it at the new. This will cause all unpaid balances to show at the current address and insure prompt collection or "cut off" before a large bill becomes due. In case postings to the different consumers' ledgers are kept by separate totals, a columnar journal can be used to keep transfer debits and credits in like manner.

These connects and disconnects can then be used to transfer the deposit numbers and amounts to the new addresses in like manner. The deposit can be ruled off at the old address and entered on the reverse side of the disconnect order and then checked off when entered at the new address. In case a number of deposits are transferred at one time, it is well to arrange the disconnects by folios and lines and rule all of them off the ledger (making notations on the back as directed) and then reverse all pairs so that the connect orders will appear on top when orders can again be assorted according to connect folios and lines and then all entries can be made at one time.

As no further transactions are necessary on the disconnects covering accounts lost, all three classes of orders are now ready for final assortment according to original numbers of the orders themselves and are then ready to be filed away for reference and audit.

Any system not containing all of the features listed above can omit any step at its proper place and let the order pass on to the next step, and any having other features not mentioned should find the proper time for their execution and insert an additional step at that point.

To insure the orderly flow of the orders through these steps, it is well to take a roomy drawer in some convenient desk and divide it into partitions, labeling them according to the different steps to be taken. As each clerk completes work taken from one division, he places those orders in the next division ready for another clerk. This shows how far any order has advanced at any time regardless of sickness or absence of any clerk and prevents omission of any step with any order.

The above suggestions have been put into practice and their worth proven. They can easily be modified to suit any number of consumers and can be easily installed at practically no expense. The advantages of such a system are readily apparent and should be passed on to others at every opportunity — hence this brief description.

Wrinkle No. 79.

TO CLEAN HARD PAINT FROM METERS.

J. R. GILBERT, 1012 BOIS DARC STR., FT. WORTH, TEXAS.

See Wrinkle No. 77 for illustration.

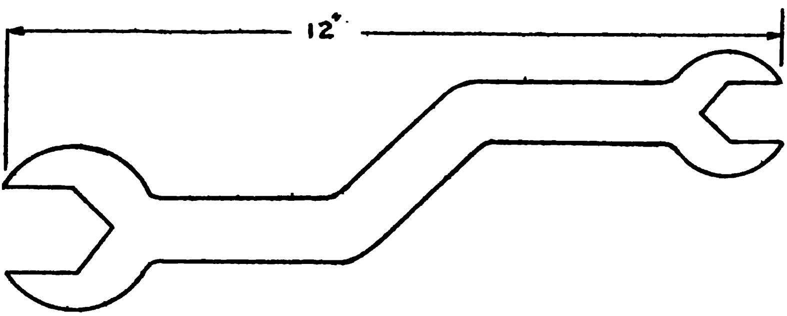
A circular wire brush revolved by power makes a useful device for cleaning hard paint from meters.

Wrinkle No. 80.

METER LEAD WRENCH.

V. A. GOBLE, THE EAST OHIO GAS CO., RAVENNA, OHIO.

This wrench prevents the damage done to brass couplings on meter leads caused by the usual method of using a pipe wrench.



METER LEAD WRENCH

Wrinkle No. 80.

Wrinkle No. 81.

MUD MIXER.

J. J. SCHUBERT, SUPT. MUDDING DEPT., EMPIRE GAS & FUEL CO., BARTLESVILLE, OKLA.

(Drawing on page 232.)

The laws of Oklahoma require the mudding of all Gas or Oil sands in wells either productive or nonproductive, when drilling to lower levels than the level in which the sands are encountered. This necessitates the saving and mixing of a shale mud free from lime or sand grits to protect the casing from freezing.

The apparatus as shown in the accompanying drawing is made of 2″ pipe and can be made to fit any size mud pit. I find it best to hold the highest pressure possible on the discharge line in order to have the mud discharge with a high velocity. The higher the velocity of the discharge mud, the more readily the mud-laden fluid will become properly mixed. The time required if good shale is used will not exceed one and one-half hours.

If it is desirable to make a larger mixer, care must be taken not to get the total area of all the holes so much that pressure cannot be held on the discharge line. This can be overcome by using a 3″ discharge line and decreasing the size holes.

Wrinkle No. 82.

A NEAT COMBINATION WELDED VENT.

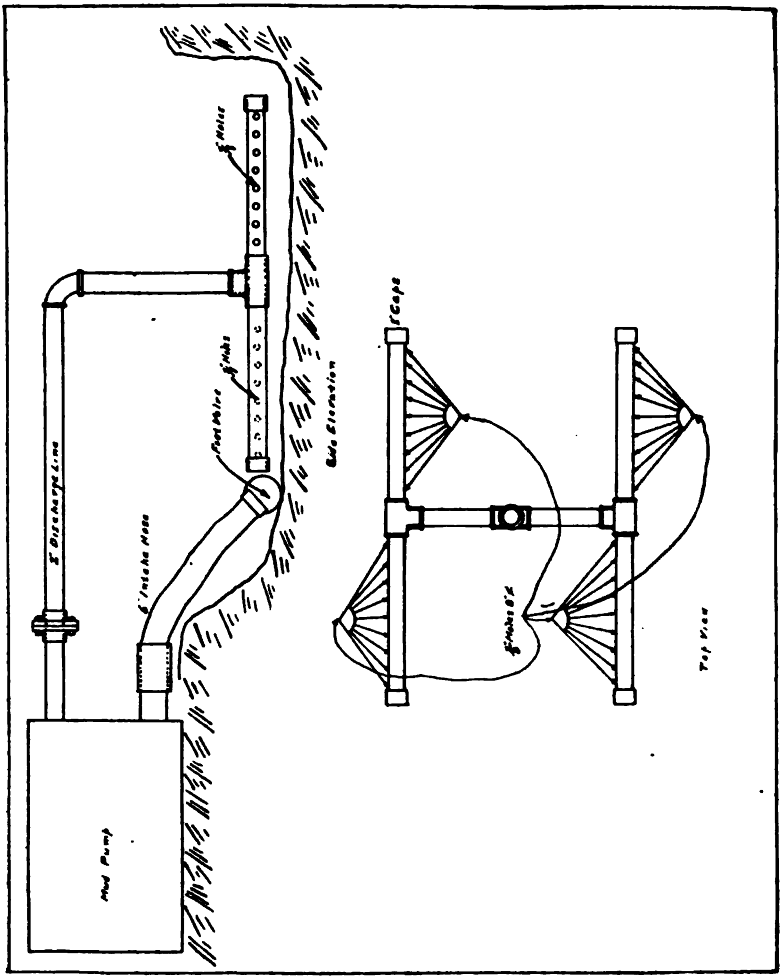
A Vent That Dispels the Certain Objection of Property Owners as to Having Too Many Unsightly Pipes Before Their Property.

THE EAST OHIO GAS COMPANY, CLEVELAND, OHIO.

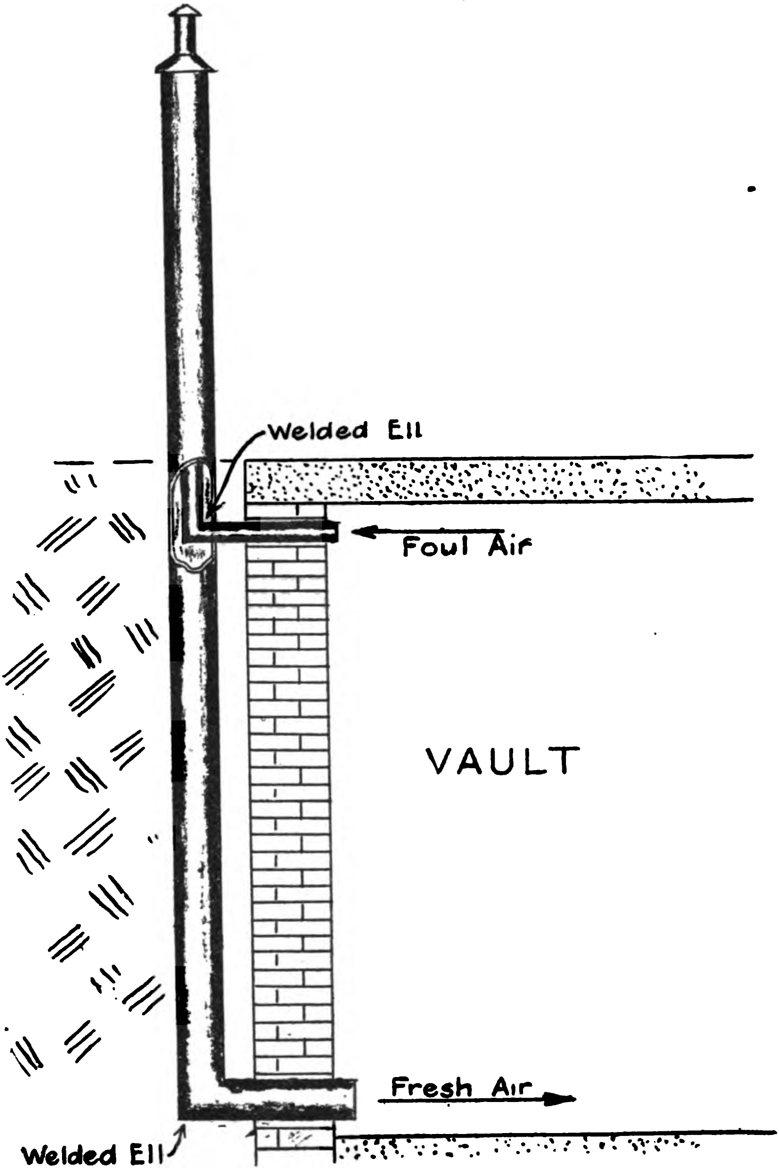
(See drawing on page 233.)

This vent can be made up of different combinations, that is: Fresh air vent, 8″ and foul air vent, 4″; fresh air, 6″, foul air, 3″; fresh air vent, 4″, foul air, 2″.

The fresh air vent is cut at the point where foul air vent enters, and a hole cut for the foul air vent; and then welded together after foul air vent is inserted. The foul air vent should extend up three (3) feet above the top of the fresh air vent.



Wrinkle No. 81.



Wrinkle No. 82.

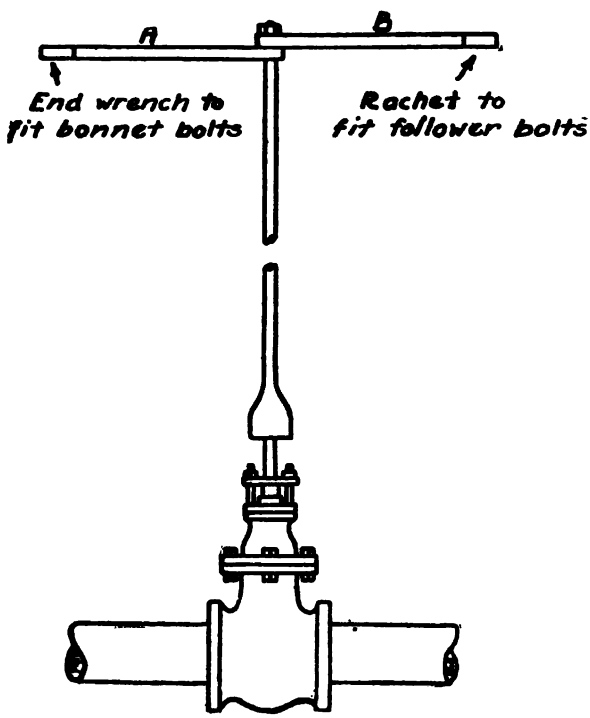
Place a spider near the top of fresh air vent to hold foul air vent in place and cover both vents with galvanized iron. This vent will always remain plumb and rigid, thus preventing the unsightly feature of vents leaning in opposite directions.

Wrinkle No. 83.

COMBINATION SOCKET AND GATE BOLT WRENCH.

LEN RYAN, BLACKWELL, OKLA.

This wrench combines all of the tools necessary for operating or repairing gate valves. The socket wrench (C) fits a 2½-inch square nut which is placed on the stem of the gate. The top end of (C) is finished square to take wrenches A and B for use as handles. The wrenches are locked by a nut on C.



Wrinkle No. 83.

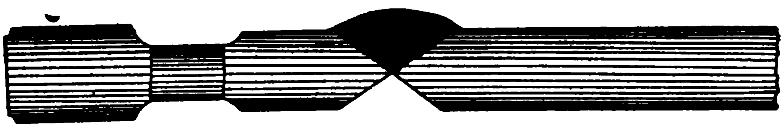
A is an open end wrench which will fit the bonnet bolts, and B is a rachet wrench which will fit the follower bolts. One of these combinations left at each gate pit would prove a time and trouble saver in emergencies.

Wrinkle No. 84.

WELDING DRILL STEM BY OXY-ACETYLENE PROCESS.

H. O. BALLARD, SUPT. PRODUCTION, EMPIRE GAS & FUEL CO., BARTLESVILLE, OKLA.

The accompanying drawing shows the method of preparing a drill stem for welding with the upper half of the stem welded. Cut both stem and box to a wedge shape, place same in the forge and pre-heat while welding, filling in with filler metals in excess



WELD OF DRILL STEM
Wrinkle No. 84.

of the size of the stem by about 20%. After both sides are filled, the stem is put into the forge and brought nearly to a welding heat, after which it is laid on an anvil and drawn down to its normal size with sledges.

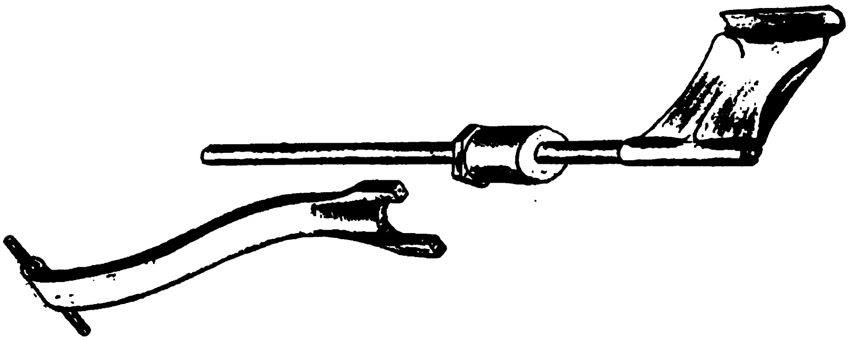
To make a good strong weld, the stem should be welded in the forge, using coal oil or coke to pre-heat to a little hotter than a cherry red. To do this, we have had to develop an acetylene torch with water circulating around the torch which keeps the torch perfectly cool, no matter how intense the heat. This method of welding stems is quite a saving, not only in time, but also money over the method of taking the stem to the shop; especially on Wild Cat wells, where the well is some distance from any repair shop. A box or pin can be welded by this process in three to four hours.

Wrinkle No. 85.

STUFFING BOX WRENCH.

LEO SVOBODA, THE EAST OHIO GAS CO., CLEVELAND, OHIO.

This wrench has met all requirements as a suitable tool for the stuffing box on the flag staff of a tin meter. The concave feature at the jaws of the wrench permit a solid grip on the nut.



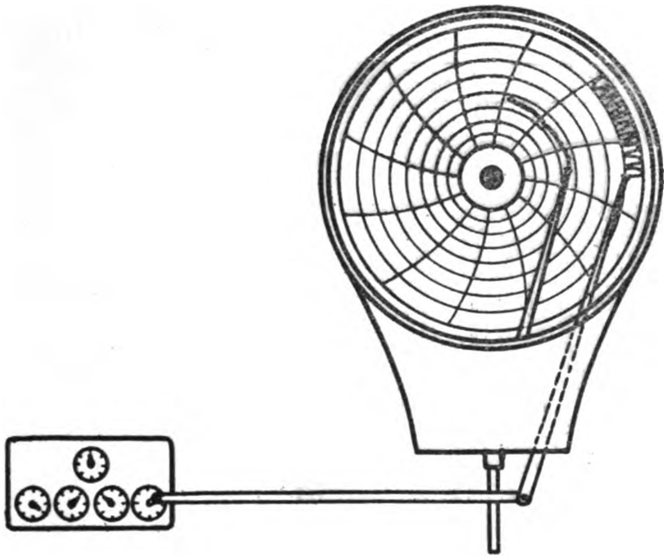
Wrinkle No. 85.

Wrinkle No. 86.

COMBINED REVOLUTION COUNTER AND RECORDING PRESSURE GAUGE.

W. C. BAXTER, METER DEPT., EMPIRE GAS & FUEL CO., BARTLESVILLE, OKLA.

The accompanying sketch shows a method of connecting up a meter dial to an engine shaft and a pin on a recording pressure gauge. The driving pin on the meter dial is connected to the engine shaft and the one thousand foot hand is connected to the pen as shown. The pen makes a loop on the chart for every one thousand revolutions of the engine. This device is very useful on natural gas compressors, as it gives the revolutions of the engine and either the intake or discharge pressure on the same chart.



COMBINED REVOLUTION COUNTER AND RECORDING PRESSURE GAUGE

Wrinkle No. 86.

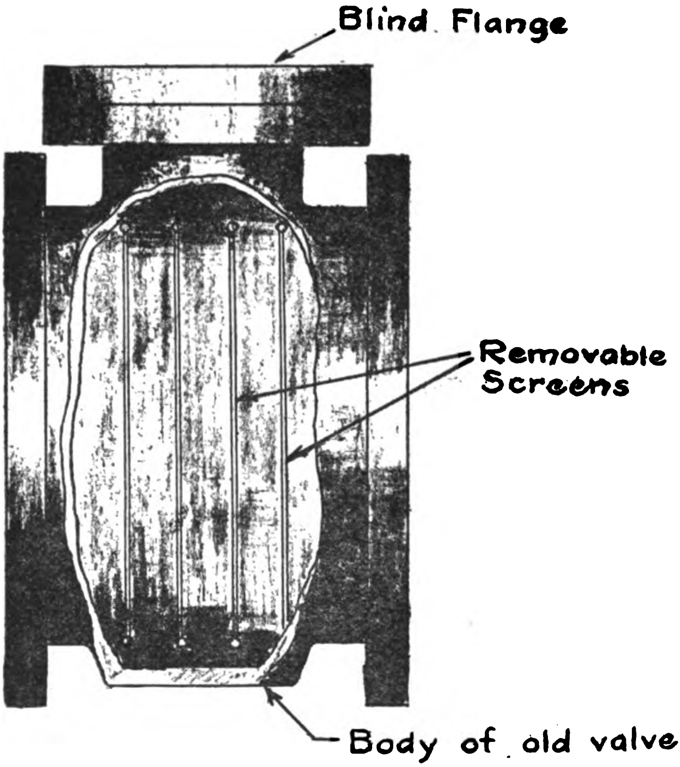
Wrinkle No. 87.

STRAINER FOR GAS MAINS.

F. DOOLING, THE EAST OHIO GAS COMPANY, CLEVELAND, OHIO.

(Drawing on page 238.)

In this case Mr. Dooling used an old gate valve body for a strainer by covering it with a blind flange and inserting a number of removable screens. It works satisfactorily.



Wrinkle No. 87.

Wrinkle No. 88.

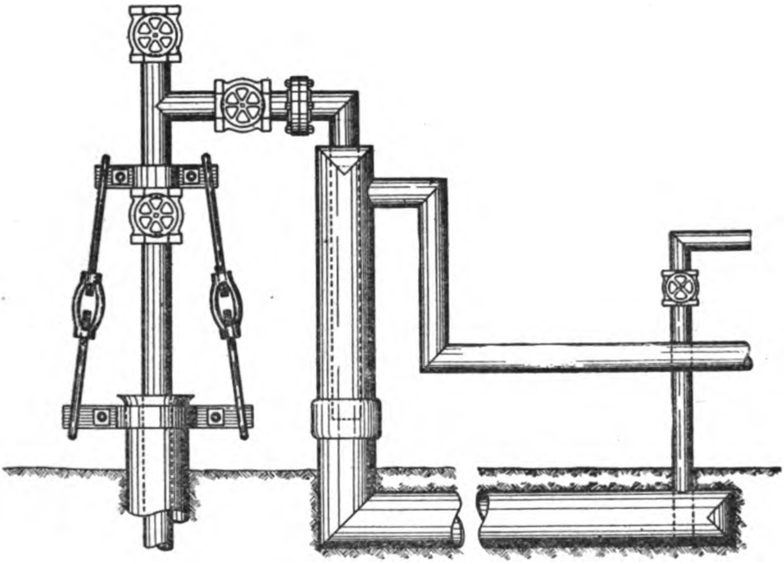
WELDED WELL DRIP AND WELL CONNECTION.

D. E. SHADER, FIELD SUPT., EMPIRE GAS & FUEL CO., AUGUSTA, KAN.

This drip and well connection is made up entirely by the Oxy-Acetylene process and is adopted by the Wichita Natural Gas. Co. as a standard type of well drip and connection in all its fields, and is giving entire satisfaction.

The length of the reservoir depends entirely upon the condition of the well. Under ordinary circumstances, we use for the reservoir, one 20 ft. length of 6″ or 8″ pipe, according to the

amount of fluid being handled. In fields where large amounts of water are to be handled, we use 40 ft. of reservoir. By using the welding process, this drip is inexpensive to build. In installing this drip, it is flanged up to the outlet gate valve of the well connection. The blow off being of the syphon type or a



WELDED DRIP AND WELL CONNECTIONS

Wrinkle No. 88.

1" pipe inserted thru the top of the reservoir to within 1" of the bottom of the reservoir pipe. The details of construction of this wrinkle are shown very clearly in the drawing.

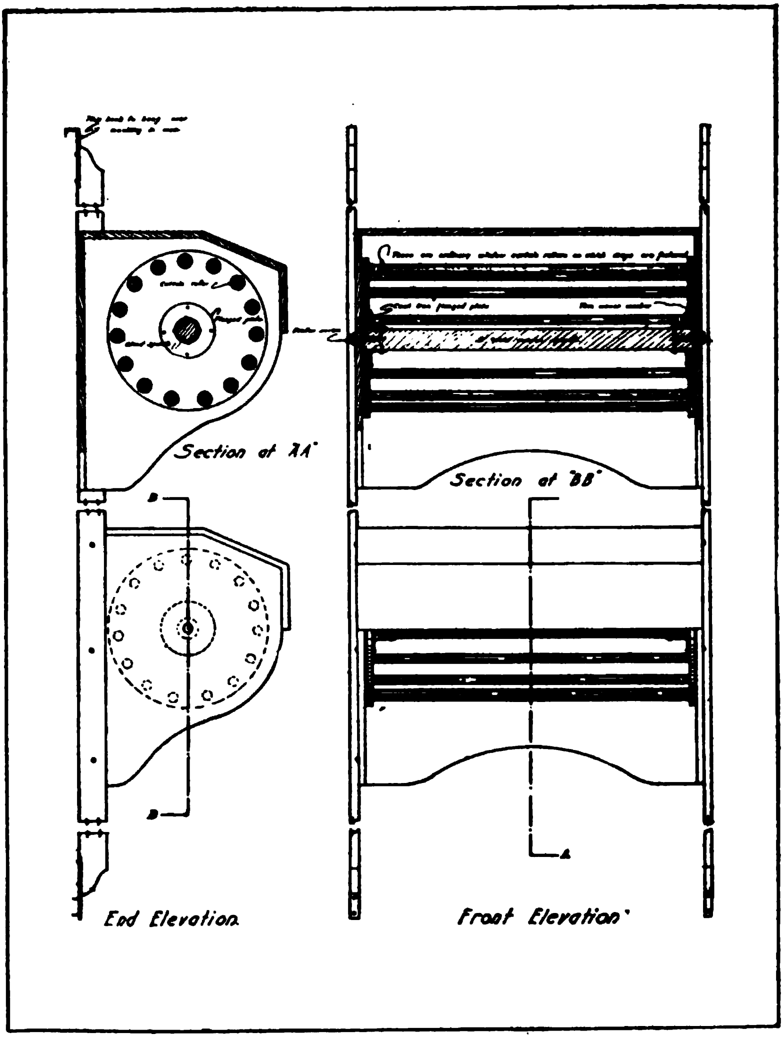
Wrinkle No. 89.

METHOD OF MAKING A HANDY MAP CASE.

S. A. MCCUNE, LAND AGENT, ARKANSAS NAGURAL GAS CO.

(Drawing on page 240.)

The one illustrated will hold 15 maps.



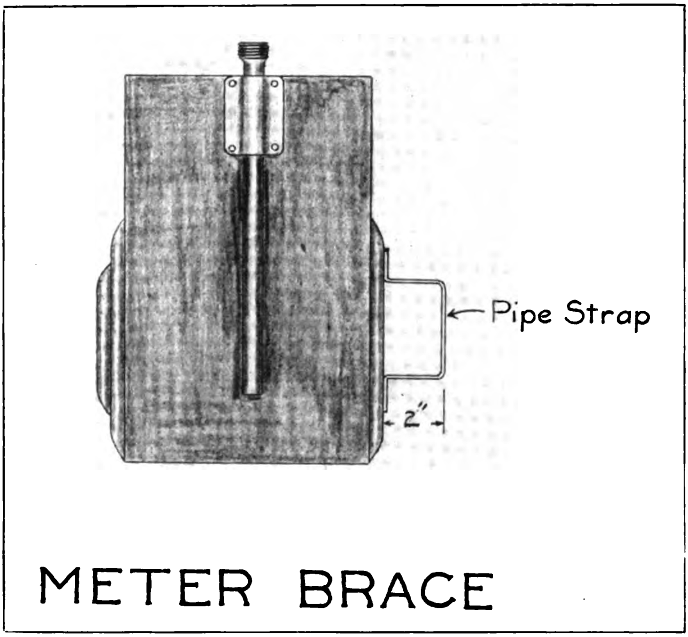
Wrinkle No. 89.

Wrinkle No. 90.

TO PREVENT TIN METERS FROM RUSTING.

A. H. FRICKER, THE EAST OHIO GAS COMPANY, YOUNGSTOWN, OHIO.

It sometimes happens, regardless of company rules, that the meter setter will place a meter too far back against basement walls; thus causing same to rust.



Wrinkle No. 90.

To prevent this, solder a metal strap on the back of meter, as shown. This prevents meter from being placed against the wall.

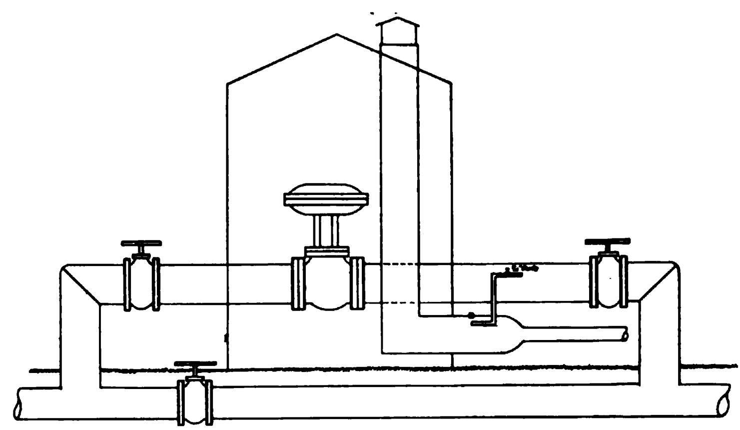
Wrinkle No. 91.

METER HOUSE HEATER.

H. O. BALLARD, SUPT. PRODUCTION, WICHITA NATURAL GAS CO., BARTLESVILLE, OKLA.

This wrinkle consists of six 8" or 10" pieces of scrap pipe welded into the shape of an "L" with one pipe collar close to

the "L" which allows the screwing apart whenever transporting from one place to another. The vertical pipe or riser, should be of sufficient length to extend thru the roof of the meter or regulator house and the horizontal piece, long enough to extend two feet outside of the side of the building where it is reduced to 2", which can be extended to any distance from the building. The horizontal pipe is tapped with ¼" tap, 1 ft. or 18" outside



METER AND REGULATOR HOUSE HEATER.

Wrinkle No. 91.

of the building. Four inches ahead of this tap, there should be another ¼" hole with a plug in it. Whenever it is desired to light the fire, this ¼" plug is removed and the gas turned on and lighted thru the hole where the plug was. After lighting, replace the plug, so that no leaking gas can be drawn into the hole. The heater gets its draft thru the 2" pipe which is some distance away from the meter or regulator.

Wrinkle No. 92.

A WEEKLY REPORT OF SERVICES AND METERS BY CITY PLANT DISTRICTS.

C. W. KRAMER, ENGINEERING DEP'T. ARKANSAS NATURAL GAS COMPANY, LITTLE ROCK, ARKANSAS.

(Copy of report shown on page 244.)

This form is self-explanatory. The object of the report is to keep the meter department in close touch with the total number of meters owned by the company and their working condition. The report also gives a good index to the amount of work done in each plant, especially when the plants are separated and at a distance from meter department.

Wrinkle No. 93.

MAIN LINE DRIP.

ROSS M STUNTZ, ASST. SUPT. LINES, WICHITA NATURAL GAS CO., BARTLESVILLE, OKLA.

(Drawing on page 245.)

The main line drip has been used by the Wichita Natural Gas Co., and proven to be satisfactory. The entire drip is of welded construction. The welding all being done in the field by the Oxy-Acetylene process. A sufficient number of 2" tie-over pipes should be installed on the inlet end to have an area equal to the area of the main line. The same applies to the number of 3" pipes on the outlet end. Each side line as well as the main line has reservoirs underneath, which is necessary for the reason that one side of the main line may have a different differential to the other which would cause the fluid to flow back into the main line if not separated.

In operating the drip, the gate valve on the main line is closed. The gas then passing from the main line into the side lines thru the 2" pipes, which baffles the gas against the side of the side lines, and then back thru the 3" on the outlet end.

No. 880—11-1-16—12 Bks.

ARKANSAS NATURAL GAS CO. .... District

Report of Services and Meters for the Week Ending..............................191....

SERVICE LINES	PLANT			PLANT			PLANT			PLANT			PLANT		
Size of Service	1¼ Inch	1½ Inch		1¼ Inch	1½ Inch		1¼ Inch	1½ Inch		1¼ Inch	1½ Inch		1¼ Inch	1½ Inch	
Total Last Report															
Installed During Week															
Removed or Abandoned During Week															
Total This Report															

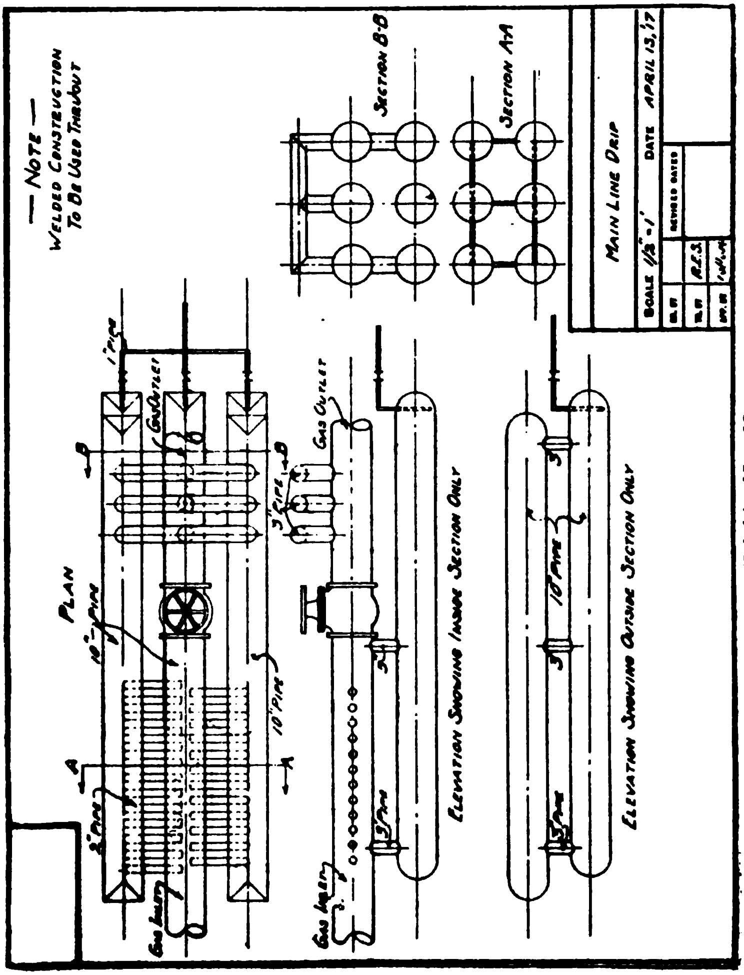
METERS	Domestic	Industrial	Domestic	Industrial	Domestic	Industrial	Domestic	Industrial	Domestic	Industrial
Total Meters Connected Last Report										
Connected During Week										
Discontinued During Week										
Total Meters Connected This Report										
Meters in Shop Last Report										
Meters Received During Week										
Meters Shipped During Week										
Meters Destroyed During Week										
Meters in Shop This Report										

Make and Number Meters Received as Follows

Make and Number Meters Shipped as Follows

Signed

Wrinkle No. 92.



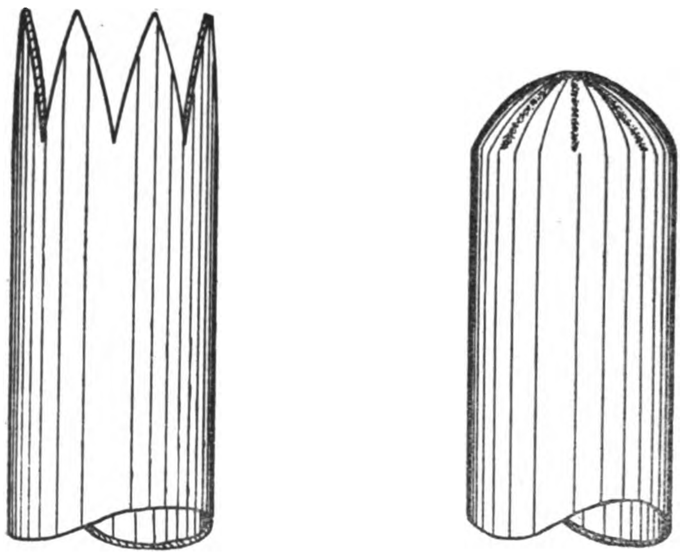
Wrinkle No. 93.

Wrinkle No. 94.

ORANGE PEEL BULL PLUG.

JOHN FINK, WAREHOUSE CLERK, EMPIRE GAS & FUEL COMPANY,
BARTLESVILLE, OKLA.

This wrinkle was adopted by the Empire Gas & Fuel Co. where Bull Plugs are used, and consists of a piece of scrap pipe



ORANGE PEEL BULL PLUG

Wrinkle No. 94.

any desired length, cut on one end to the shape of an orange peel, which is heated in a forge and the points or lips are bent to the center and welded togeter, with a thread turned on opposite end.

Wrinkle No. 95.

10-INCH EXPANSION SLEEVE MADE IN KANSAS.

J. A. REMLER, KANSAS NATURAL GAS CO., INDEPENDENCE, KANSAS.

The drawing on page 248 is of a ten-inch expansion sleeve of our own make which we have put in service on the discharge lines at Petrolia Station.

We have experienced several blow-outs on the discharge lines at Petrolia Station where they enter the cooler due to expansion in the cooler and this expansion sleeve has eliminated all of this trouble.

This is not a new wrinkle, being just an expansion sleeve of our own make, the patterns for the casting being made at our plant, and may be of interest to the readers of this department.

The expansion at the point where this sleeve is used is about three inches, and many times pulling the threads out of the flange, and sometimes breaking the flange or pulling the threads out of a valve connection.

The stuffing box on this sleeve is packed with a high grade woven asbestos.

Wrinkle No. 96.

IMPROVED REGULATOR.

G. T. SPETTIGUE, OIL CITY, PA.

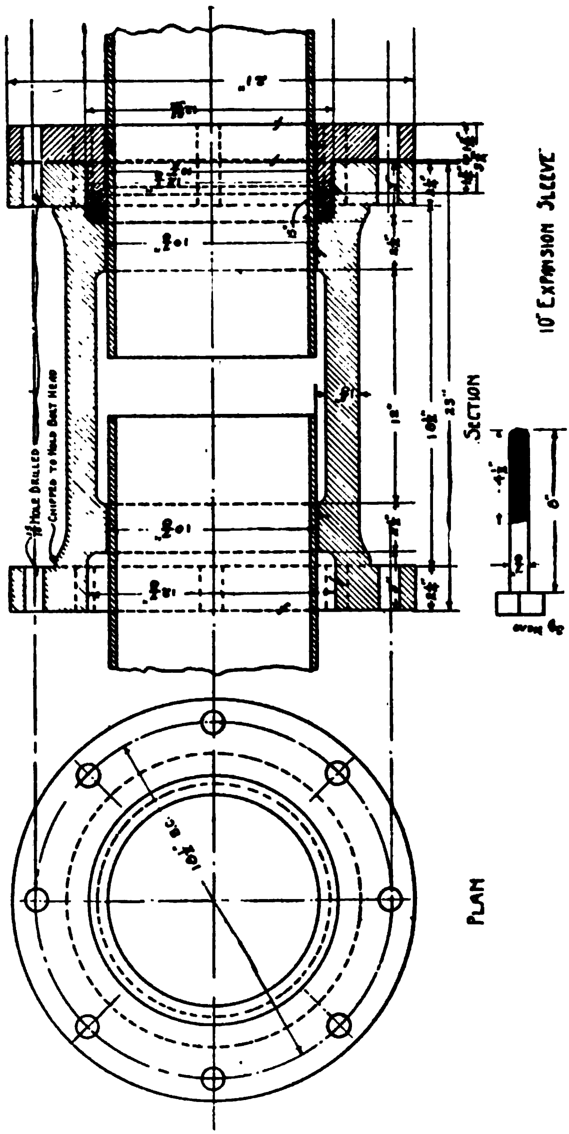
(See drawing on page 249.)

A gasometer is the most sensitive gas regulator known for reducing natural gas from high pressure to low pressure for domestice service.

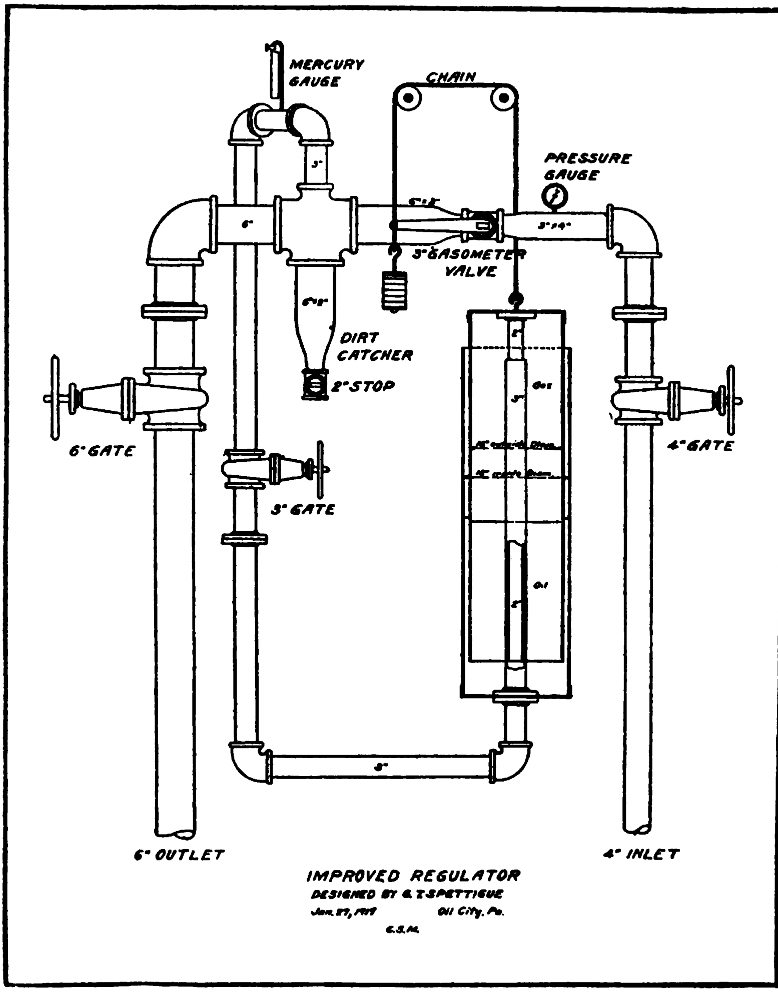
A gasometer valve has no rubber seat to be cut by any sandy or oily substance in passage, nor will freezing affect it.

One valve has been in use in Oil City since 1883 without repair.

There are ten gasometers in Oil City which have been in use since 1883 and 1885 and have required no repairs after thirty-two years of continuous service.



Wrinkle No. 95.



Wrinkle No. 96.

Wrinkle No. 97.

COMBINATION GAS GAUGE AND SIGNAL BELL.

G. C. TUCKER, THE EAST OHIO GAS CO., MASSILLON, OHIO.

(Drawing on page 251.)

This wrinkle was submitted by Mr. Tucker, who has used it for years, but it may be new to others.

Solder a piece of No. 14 bare copper wire to end of goose-neck marked "A." Cut wire off so that when goose neck is in place and fastened to the "U" tube the wire will stop at a point just short of .2 below zero; this will equal 3 ounces. Then drill two $^1/_{16}$" holes in the vent cap; one on each side of the vent hole.

Take two No. 18 insulated copper wires, clean insulation from No. 2 wire for ½" and from No. 3 wire for 1". Shove wires down through the $^1/_{16}$" holes until No. 2 wire is .8 above zero and No. 3 wire is about .8 below zero. Fasten these two wires in this position with a drop of sealing wax on each wire at "B". Run No. 1 wire from thumb nut of gauge to one of the binding posts on the electric bell.

Scrape off the insulation and fasten No. 2 wire to No. 1 wire at any convenient point. Run No. 3 wire through the battery and switch, as shown, to the other binding post on the bell.

If pressure drops to 3 ounces or goes up to 13 ounces, this little joker is on the job to let you know all about it.

Wrinkle No. 98.

METHOD TO PREVENT TIPPING OF METER, THEREBY ELIMINATING USE OF UN-METERED GAS.

G. C. REED, TELEPHONE FOREMAN AND METER INSPECTOR, LONE STAR GAS CO., FORT WORTH, TEXAS.

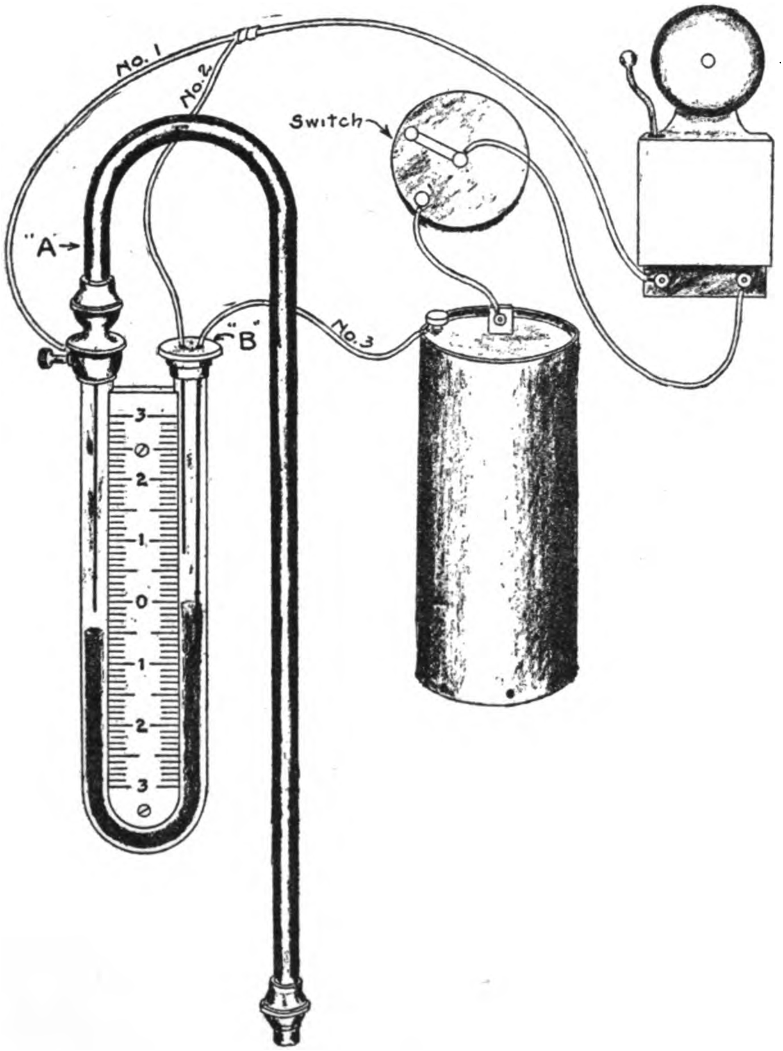
(Drawing only, see page 252.)

Wrinkle No. 99.

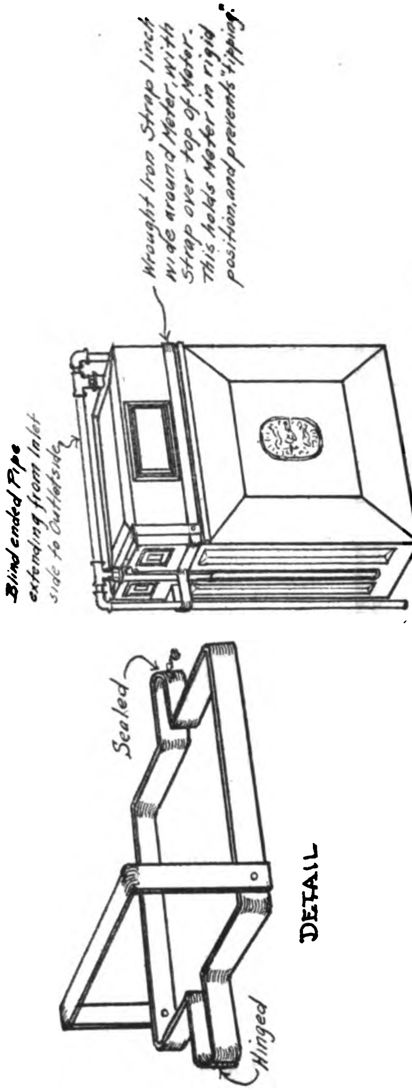
FIRE EXTINGUISHING GAS HOOD FOR BURNING GAS WELLS.

H. O. BALLARD, SUPT. PRODUCTION, WICHITA NATURAL GAS CO., BARTLESVILLE, OKLA.

The accompanying drawing shows a steel hood adopted by the Wichita Natural Gas Co. for extinguishing gas well fires. The wrinkle consists of a welded steel hood made out of ⅝"



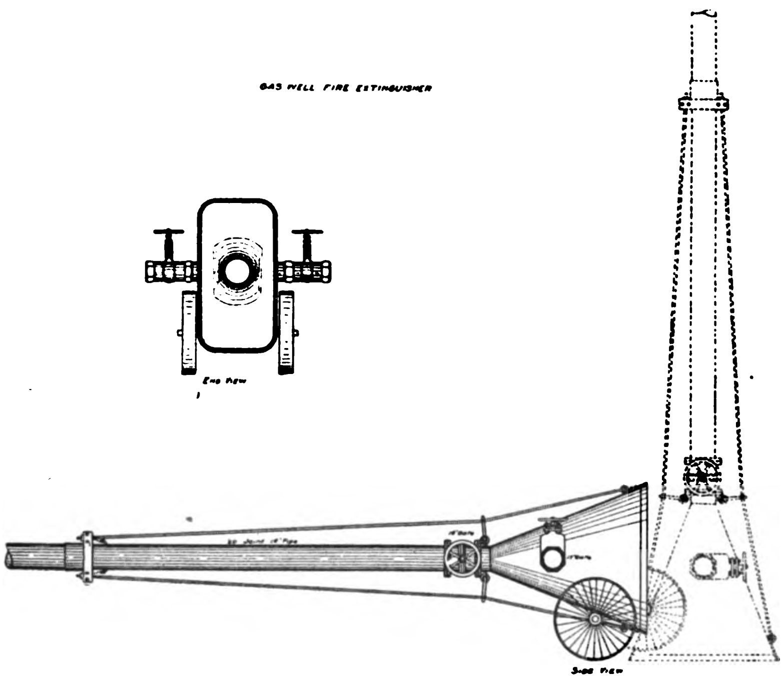
Wrinkle No. 97.



METER—SHOWING STRAP IN POSITION

Wrinkle No. 98.

steel plate, 9 ft. high by 8 ft. at the mouth and 4½ ft. wide, with a 16″ gate flanged at the top and two 12″ side gates about 3 ft. from the bottom extending from each side. Extending from the 16″ gate, a joint of 16″ pipe is used, or more according to the size of the fire. The 12″ side gates allow the laying of two 12″ side lines from the hood to any distance desired, which allows



Wrinkle No. 99.

the side gates to be open and the 16″ gate on top of the hood closed, which forces the gas and fire any distance desired from the well.

After the gas is forced thru the 12″ side gate, the 16″ gate at the top is opened and the 12″ side gates closed. After the hood is in position beside the well, it can be raised in 15 seconds with the aid of automibile trucks or teams.

The method of raising is by the use of two shear poles 20 ft. high, welded in the shape of a triangle which raises the two front guy wires 20 ft. from the ground which gives an angle sufficient to make the raising of the hood very easy. In connection with the hood, we use two steel shields 8′ x 20′ mounted on wheels which can be wheeled into position around the burning well and protect the men from the heat while doing any necessary work.

Wrinkle No. 100.

MAGNETIC-AIR-WHISTLE, FOR TELEPHONE ALARM, FOR USE IN GAS COMPRESSING STATIONS.

W. E. NESTER, ENGINEER THE MANUFACTURERS' LIGHT & HEAT CO., WAYNESBURG, PA.

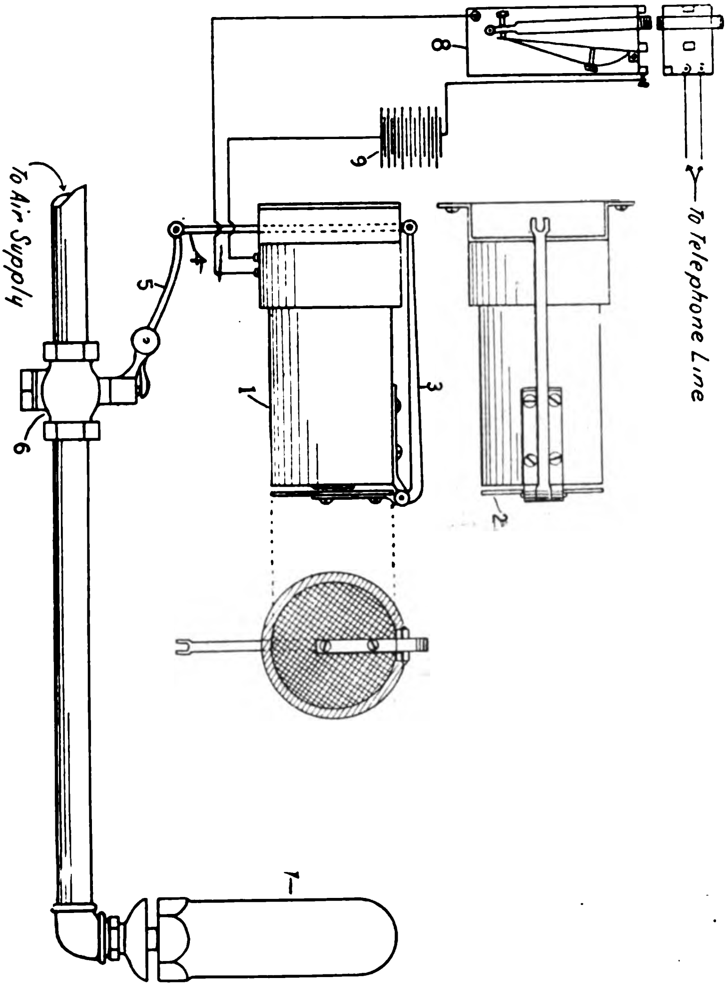
Considerable difficulty is at times experienced by the City Office and Pressure Stations in securing telephone connections with the Compressing Stations, on account of the noise in the engine room.

Gongs are objectionable in the compressor building on account of the ever present danger from the spark which they make while ringing. Klaxon Horns, while an improvement over the gongs are not reliable, due to the commutator becoming rough from frequent use, or brushes sticking, failing to operate successfully. And while they are usually encased, they are not entirely gas proof.

The accompanying sketch shows the general arrangement of a very dependable alarm which the writer constructed to overcome the objections of the Gong and Klaxon.

Taking a discarded electro-magnet (1) that was formerly used for operating a revolution counter on the compressor engines, we mounted it on a piece of 1″ oak board 10″ x 16″ and directly below mounted a standard ⅜″ whistle valve (6) one end of which was connected with the air supply used for starting the Compressor engines, the other being connected to a line running to a 1½″ chime whistle (7) mounted on the gauge board.

Lever (5) on the whistle valve, and arm (3) of the electro-magnet were connected by rod (4).



Wrinkle No. 100.

Electrical connections were then made from the electro magnet (1) to the batteries (9) and telephone relay (8) current is taken from the storage batteries used for ignition on the Compressor Engines.

When the telephone rings the relay closes the circuit between the batteries and electro-magnet, magnetizing the iron core with the latter, causing the steel plate to be drawn in, and raising arm (3) which in turn lifts lever (5) and opens whistle valve (6) allowing air to pass from storage tank to whistle.

If carefully constructed this device will be found to be a very dependable alarm, as there are no adjustments to make after it is installed, no danger from electric spark, and the whistle responds almost instantly to each ring of the telephone bell.

The chime whistle makes a pleasing sound that can be heard at any point in or near the station, regardless of the noise in the engine room, and there is no misunderstanding the number of rings on the phone, as the alarm is distinctly sounded at each ring of the bell.

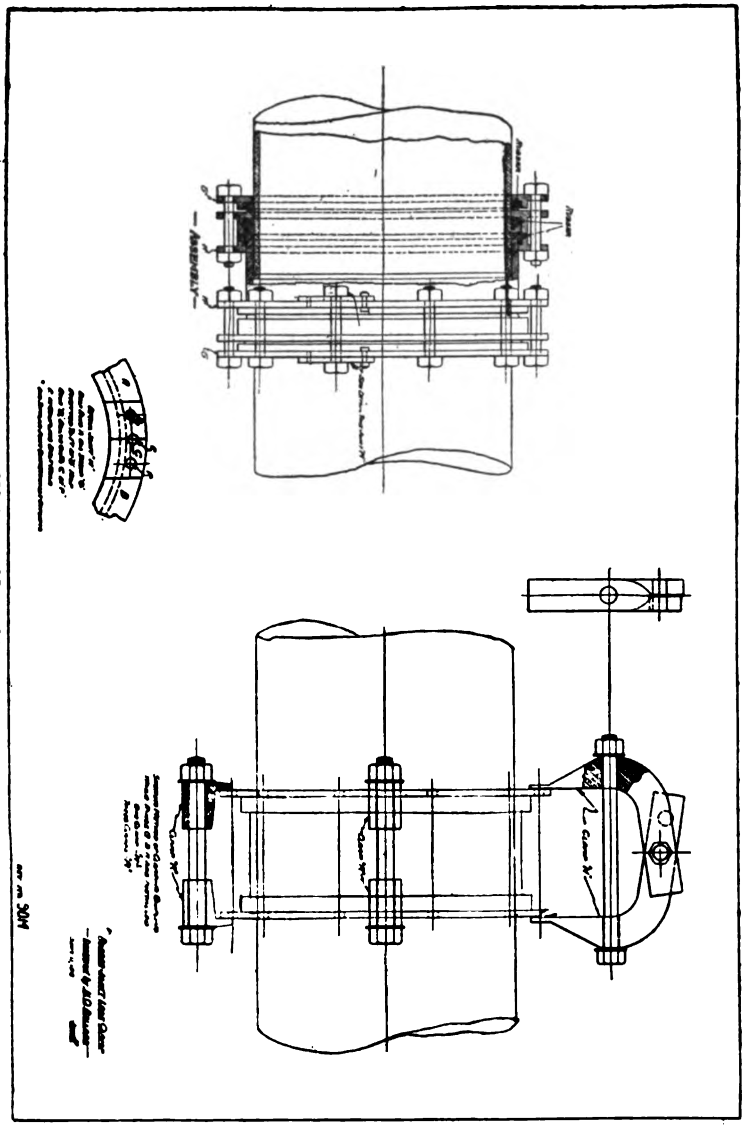
The Electro-magnet and whistle valve can be mounted at any convenient place, and the whistle placed on the gauge board if desired, but quicker response at the whistle will result if they are kept near each other, on account of the time intervening between the opening of the valve and air reaching the whistle.

Wrinkle No. 101.

RUBBER JOINT LEAK CLAMP.

R. B. LLOYD, SUPT. LINES. H. O. BALLARD, SUPT. PRODUCTION,
WICHITA NATURAL GAS CO., BARTLESVILLE, OKLA.

Owing to the fact that the emergency sleeve commonly used for high pressure gas lines is so expensive and heavy to handle, this wrinkle was devised to take the place of the ordinary emergency sleeve. The clamp is of such light construction that one man can easily handle and repair a leak without extra labor. The material used consists of two sets of followers, either Dayton or Dresser, which have been sawed in half with one set of followers turned out to the outside diameter of the center ring. The other set, the same size as the outside diameter of the pipe.



Wrinkle No. 101.

All rings are made to join together in the same manner as collar leak clamps are joined, using rubber as with common collar leak clamps.

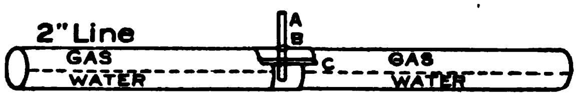
To install with pressure on the line, we use three two-jaw clamps which fit from outside to outside of the old coupling and allow the removing of the original coupling bolts and holds the followers in place while putting on the repair clamp. The clamp is put on with short bolts, extending from one inside follower to the outside. When installed, leaving no truss bolts as used in the original coupling.

Wrinkle No. 102.

TO DRAIN WATER FROM LINE.

CORWIN ANDREWS, AGENT, THE OHIO FUEL SUPPLY COMPANY, BALTIMORE, OHIO.

The drawing shown is of an appliance used to drain water from the line. This is not original with me, but I have used it



A. 3/8 All thread nipple
B. 1-1" X 3/8 bushing
C. 1-2 x 1" - saddle

Wrinkle No. 102.

with considerable success. It can be screwed into top of service line and the gas pressure will lift the water through the 3/8 all thread nipple.

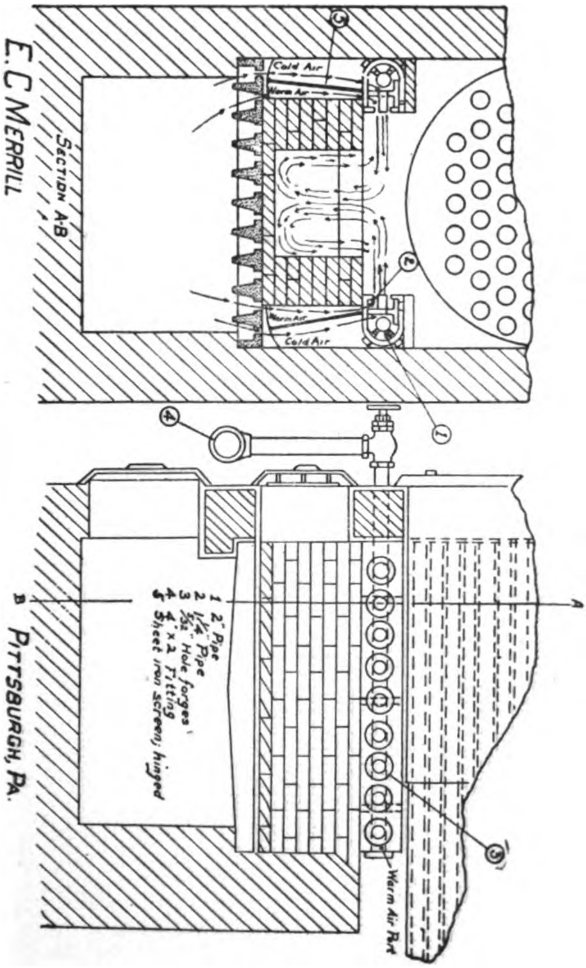
Wrinkle No. 103.

GAS BURNERS THAT PERMIT BURNING OF OTHER FUEL.

EDWIN C. MERRILL, GAS ENGINEER, PITTSBURGH, PA.

I am sending you for publication drawing of furnace used under steam boiler.

RETURN TUBULAR BOILER FURNACE EQUIPPED WITH SIDE-WALL GAS BURNERS PERMITS THE BURNING OF REFUSE



Wrinkle No. 103.

This construction admits of refuse or wood being burned when gas is short, and if used as here shown does not destroy the economy of the fuels with excess of air thru the bars.

The life of this equipment is about ten years as we have made renewals for parties who continue to use same after that length of time.

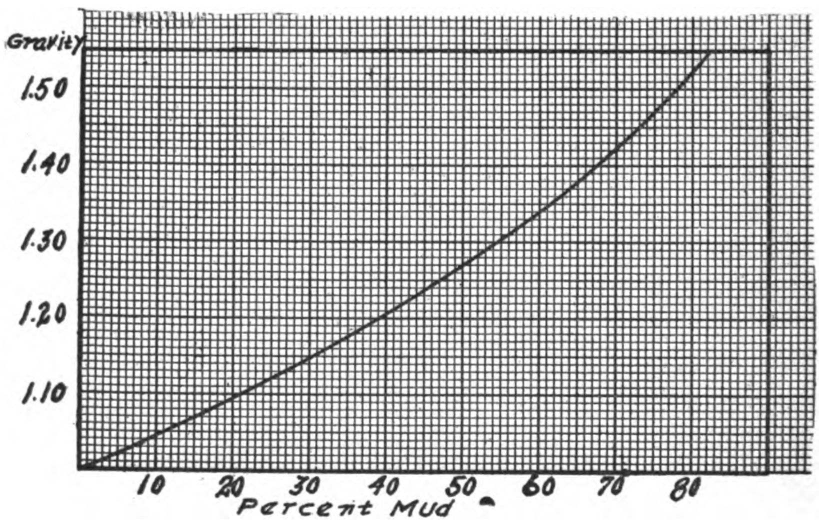
It is sent you as a valuable asset to any gas company wishing to install equipment that will assist in holding a customer thru a shortage.

Wrinkle No. 104.

HYDROMETER FOR TAKING THE SPECIFIC GRAVITY OF MUD-LADE FLUID.

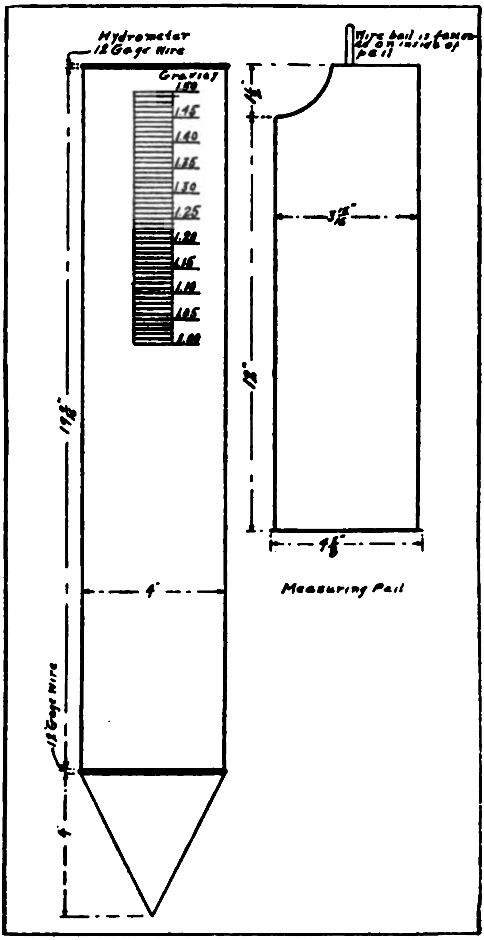
J. R. STEWART, DOHERTY CADET, WICHITA NATURAL GAS CO., BARTLESVILLE, OKLA.

The apparatus contains a calibrated brass tube and measuring cup as shown in the accompanying drawing. The measuring cup holds just enough water to make the hydrometer sink to the point marked 1.00 on calibrated scale as shown on drawing when placed in a barrel of water; placing one and one-half



Wrinkle No. 104.

cups of water in, hydrometer will sink to the point marked 1.50 dividing this distance into fifty equal parts gives gravity readings in 1/100 above 1.00.



Wrinkle No. 104.

To take the specific gravity of mud-laden fluid place one cup of mud-laden fluid in hydrometer and where hydrometer sinks above 1.00 will be the specific gravity of the mud-laden fluid.

The laws of Oklahoma, state that the proper mixture to be used in mudding off small oil and gas pays encountered while drilling and are not desirable to be shut in for immediate use should range from 15 to 25% mud and not less than 15% mud shall be used.

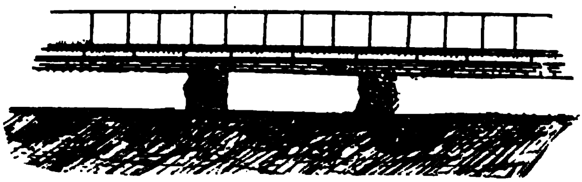
I have some curves that show the percent mud corresponding to various gravities and with shale taken from the various fields. The accompanying curve is for the Garfield county field in Oklahoma. We find it much better to use from 40 to 60% mud instead of 15 to 25% mud as specified by the state of Oklahoma.

Wrinkle No. 105.

LEAVE SECTIONS OF PAVEMENT TO PREVENT CAVE-IN.

JAMES J. CUMMINS, THE OHIO FUEL SUPPLY CO., COLUMBUS, OHIO.

In digging a trench on paved streets or well packed macadam roads, it is a good practice to leave sections of the paving, or



Wrinkle No. 105.

macadam, every ten or twelve feet, as shown in the sketch.

These sections need only be a foot or so wide and the earth may be removed beneath them. These little sections thus left help to prevent a cave-in and they also give the old road level when putting in the pavement patch, after the fill-in.

Wrinkle No. 106.

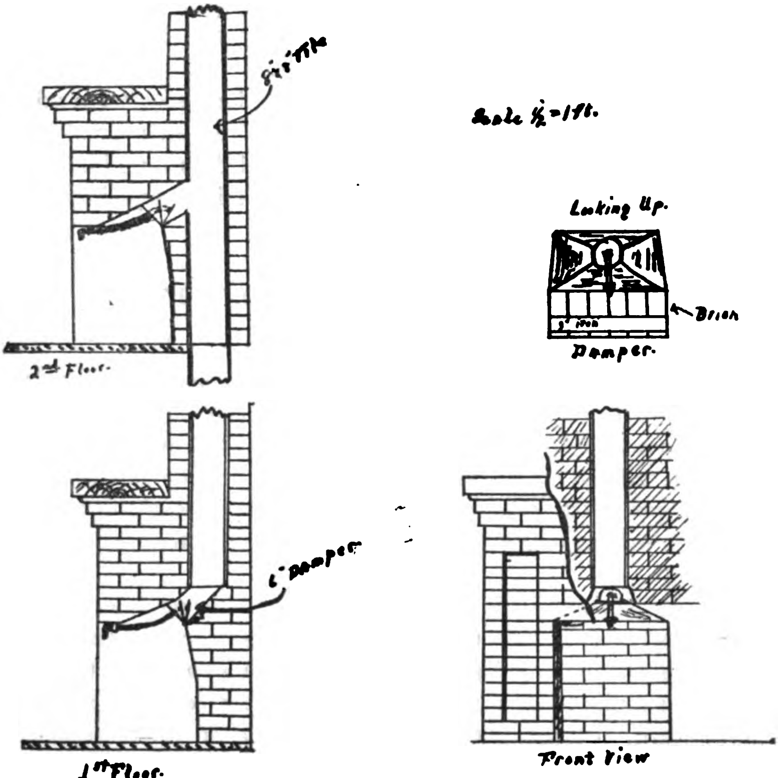
INTERIOR FIREPLACE DESIGN.

F. R. HUTCHINSON, SALES MANAGER, THE GAS APPLIANCE COMPANY, CLEVELAND, OHIO.

Many complaints are reported to gas companies because of improper construction of fireplaces and flue outlets, causing

products of combustion to escape in rooms where grates or logs are used.

Architects seldom, if ever, specify how fireplace interiors and flue outlets should be constructed.



Wrinkle No. 106.

One way of overcoming, at least in a measure, complaints of his kind would be to have fireplace interiors built as illustrated.

First, depth should be about as indicated on drawing, with straight sides.

Front of top, roof or ceiling should be lower than rear to provide a canopy shaped roof to retain and convey smoke or

products of combustion, where wood, coal or gas is employed, to flue outlet.

Flue outlet made large, with damper for regulation to care for any fuel used.

Opening leading to flue should be made at an angle as shown, so products of combustion can freely pass to chimney.

Two sets of drawings made one illustrating flue above center of fireplace opening, the other at rear.

I would suggest, and recommend, that the Association adopt this as a "standard fireplace interior" and have it printed in large quantities, sold to gas companies at cost and distributed by them without charge to every architect and builder in every city where natural gas is sold.

Wrinkle No. 107.

PASTE INFORMATION RIGHT ON METER.

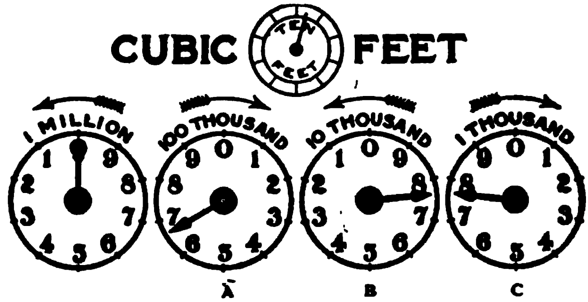
THOMAS E. BALKIN, IROQUOIS NATURAL GAS CO., BUFFALO, N. Y.

Having often observed the number of consumers of natural gas who call at the office or write requesting a re-reading of their meter, which they believe has been read wrong for the monthly bill, and also, having noted how few of the users of natural gas know how to read a meter, I am prompted to offer the following "wrinkle", which I trust will meet with your approval.

Shown herewith is a sheet of instructions on how to read a gas meter and how to determine whether or not the house piping is leaking. Why would it not be a good idea to paste a sheet similar to this in a conspicuous place on all the meters on a plant, so that a consumer attempting to read his meter would not be at a loss on how to read same and could readily verify the state of his monthly bill. At the same time if he felt that there was something wrong, he could make a test of his own house piping to determine whether or not same was leaking.

This scheme, I figure, would work better than any circulars passed among the consumers with this information, since such circulars are mislaid or lost, and as a result the consumer is obliged to call at the office or write requesting a re-reading and

a test of the house piping. In the scheme above mentioned, the instructions are always where they may be found, and I think the plan would do away with much extra work along this line.



READING THE METER.

It is advisable that all gas consumers understand the reading of their gas meter. It affords a way to determine whether or not there is a leakage of gas in the pipes or fittings. The meter also is a means of verifying monthly gas statements.

Dial "A" (as indicated by illustration above) reads "6," because it has not yet reached "7." Dial "B" reads "7" for a like reason, and dial "C" reads "7." Put down these figures, namely 677, and add two ciphers, because the lowest, or "C" dial, represents hundreds. Thus you have 67,700 cubic feet. Subtract from this the figures of last month's reading, say 65,000, and you have what you must now pay for, 2,700 cubic feet. It's very simple. Try it.

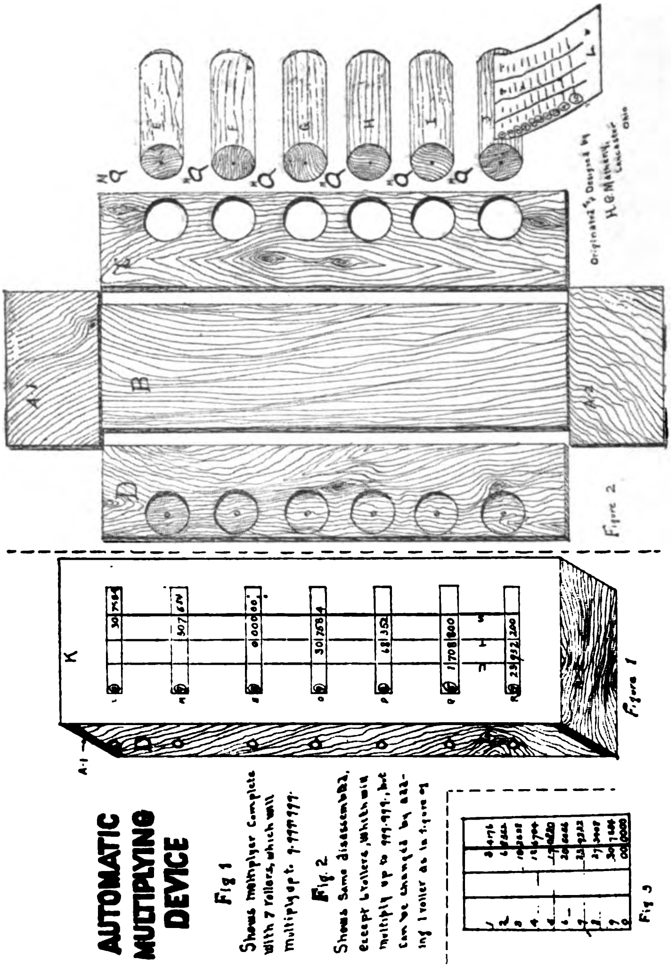
To determine whether there are any gas leaks, turn off all the gas stoves, lights and other appliances in the building where gas is used, then watch the hand on the ten foot dial of the meter for half an hour. If the hand has moved at the end of this period, it would then indicate that gas was leaking. In such event, inspect all valves and fittings, and if a leak is found repair at once. Leaking gas is dangerous and expensive.

Wrinkle No. 108.

THE AUTOMATIC MULTIPLYING DEVICE.

H. G. MATHENY, THE LOGAN NATURAL GAS & FUEL CO., LANCASTER, OHIO.

This device is especially designed for figuring Pilot Tube extensions, or other work where we have a fixed multiplier. This simple device has been used very efficiently in the office of



Wrinkle No. 108.

The Logan Natural Gas & Fuel Company, at Lancaster, Ohio, for several months.

Figure 1 shows the device arranged for the co-efficient of a certain Pilot tube which is "3.4176" figuring the equivalent in cubic feet of 7,529,099 inches, which would require the following problem by multiplication:

7,529,099.
3.4176

By the means of this device we merely turn the rollers to where the marginal figures appearing represent the inches to be figured as follows:

The 1st roller (L. Fig. 1) represents what 1 to 9 inches equal — in this instance "9"

The 2nd roller (M. Fig. 1) represents what 10 to 90 inches equal — in this instance "90"

The 3rd roller (N. Fig. 1) represents what 100 to 900 inches equal — in this instance "0"

The 4th roller (O. Fig. 1) represents what 1000 to 9000 inches equal — in this instance "9000"

The 5th roller (P. Fig. 1) represents what 10000 to 90000 inches equal — in this instance "20000"

The 6th roller (Q. Fig. 1) represents what 100,000 to 900,000 inches equal — in this instance "500,000"

The 7th roller (R. Fig. 1) represents what 1,000,000 to 9,000,000 inches equal — in this instance "7,000,000" Then add.

Material and Construction.

A—1 and 2—End pieces—2 boards 1¾" x 3" x ¼ thick.

B—Bottom piece 1 board 2½" x 8½" x ¼" thick.

C—Side piece—1 board 1¾" x 8½" x ¼" thick, with ⅞" holes bored through.

D—Side piece—1 board same size as "C" but with holes bored *nearly* through.

E, F, etc.—Wood rollers 2— ⅞" x ⅞" diameter (made of ⅞" curtain poles.)

K. (Fig. 1) Tracking cloth—3" x 9", ruled for comas and decimal points, and strips cut out over each roller.

L—Strips of paper 2" x 3", ruled for comas and decimal points (See S. T. and V, Fig. 1), also (See Fig. 3), also see "Roller Slips".

M—Screw Eyes to hold rollers in place and to enable operator to turn the rollers to desired position.

Roller Slips.

The paper for roller "E" should be made up as follows: Place figures 1 to 9, at even intervals, on the margin, leaving ¼" space at the top for aid in gluing to roller. Opposite the figure 1 should the multiplier, opposite the 2 twice the multiplier, opposite the "3" three times the multiplier, etc., down to 0 (See Figure No. 3.)

The paper slip for "F" should be the same, except to point off one less decimal, or add one cipher as the case may require, but keep the decimal point in a perpendicular line with "E."

The remaining rollers are treated the same, pointing off one less decimal, or affixing one more cipher. Study the 9s appearing in figure 1.

Wrinkle No. 109.

IT PAYS TO TEST THE ROCK PRESSURE.

DAVID WHITE, HOPE NATURAL GAS COMPANY, SMITHVILLE, W. VA.

I find that it pays to test the rock pressure of drilling wells. The following is a report of one well that I was in charge of for the Hope Natural Gas Co.:

The 6⅝" casing was run in the Big Lime; a very nice flow of gas was struck in the Thirty Foot sand with a rock pressure of 130 pounds. Drilling was continued, 5 3/16 casing run in the Garden Stray bringing the Thirty Foot gas between the 6⅝ and 5 3/16" casing, drilling was continued and another flow of gas was struck in the Gordon sand; 1 hour rock pressure 825 pounds. The well was then drilled to the Fourth sand and another nice flow of gas was struck. Shutting the Gordon sand gas and the Fourth sand gas in the 5 3/16" casing the rock pressure did not exceed 90 pounds. Ran 3" tubing and set packer between Gordon and Fourth sand gas. The rock pressure of

the Fourth sand in the 3" tubing was only 90 pounds and the rock pressure of the Gordon sand in the 5 3/16" casing was 875 pounds.

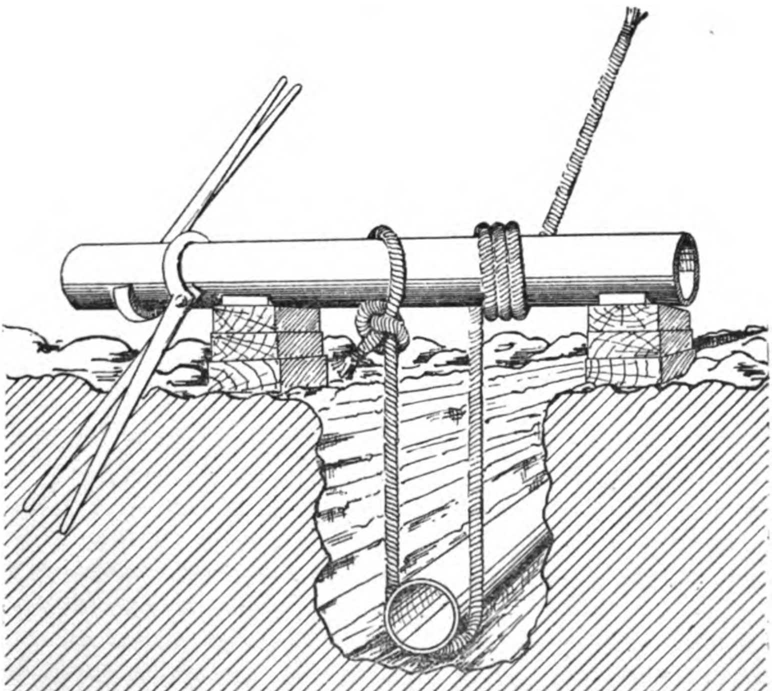
Wrinkle No. 110.

WRENCH FOR TAKING PIPE OUT OF DITCH.

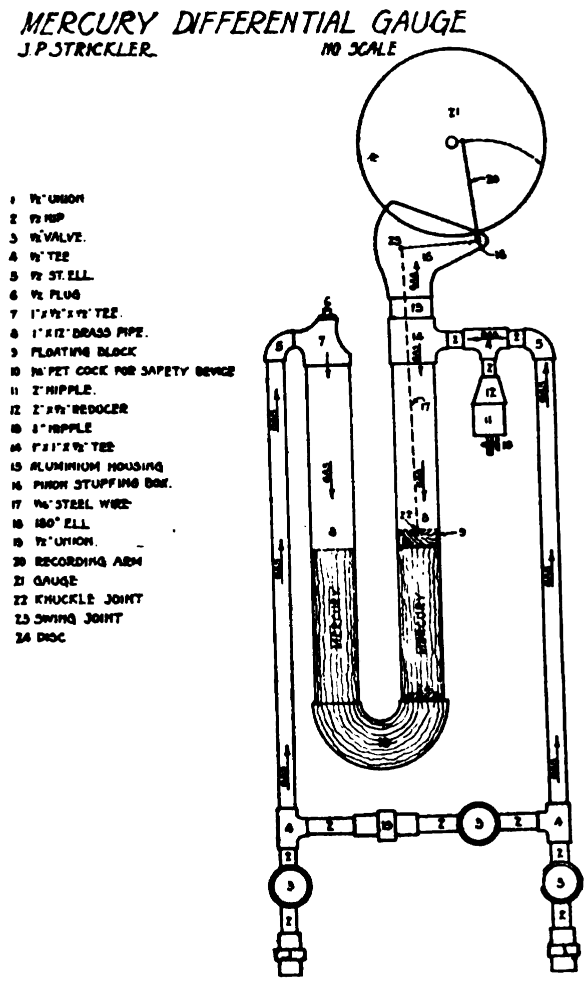
JAMES P. STRICKLER, COLUMBUS GAS & FUEL CO., COLUMBUS, OHIO.

This is old to me, so much so that I hesitate about sending it, it may, however, be of some help to some of the boys who have not employed it.

Use a piece of either 4 or 6 inch pipe about 10 or 12 feet long, enough to cross your ditch and give you a good-bearing on both banks, two pair of pipe tongs and a good manilla rope



Wrinkle No. 110.



Wrinkle No. 111.

about 1½ inches in diameter; make loop in one end and slip the rope around the pipe; put the rope under the pipe in ditch and then roll around your pipe above ditch three or four times; use three men, one each to man the tongs and one to hold the loose end of the rope. You can lift almost any size pipe out of the ditch with blocks of wood under your pipe sufficiently high enough so that you can put bart under the pipe above the ditch. This is a much quicker way to raise pipe than with a gin pole and horse and can be worked with much fewer men.

Wrinkle No. 111.

MERCURY DIFFERENTIAL GAUGE.

JAMES P. STRICKLER, COLUMBUS GAS & FUEL CO., COLUMBUS, OHIO.

(Drawing on page 270.)

The above Mercury differential gauge is a home-made affair and can be made entirely out of pipe and pipe fittings, excepting the housings for shaft 16 and 23 referred to in drawing. This housing can be made out of any material, brass or iron, and is screwed to the one inch tee No. 14 in the drawing. Recording gauge can be attached by putting the whole instrument on a board and having a chart scale to suit the user. This gauge will give absolutely correct reading of the differential pressure and can be made any length the user may desire.

Wrinkle No. 112.

AUTOMATIC ORIFICE METER CONTROL.

T. H. KERR, ENGINEER, THE OHIO FUEL SUPPLY CO., COLUMBUS, O.

An Orifice Meter consists of a plate with a circular hole or orifice in the center, so placed in a pipe line that the fluid (gas, air, steam, oil, or water), to be measured must pass through it, with suitable instruments for indicating or recording the pressure through the orifice.

An Orifice having a diameter of ¾ of the pipe diameter or less offers considerable resistance to the flow of fluid, which is apparent by the drop in pressure between the two slides of the Orifice. This drop in pressure is called the differential pressure.

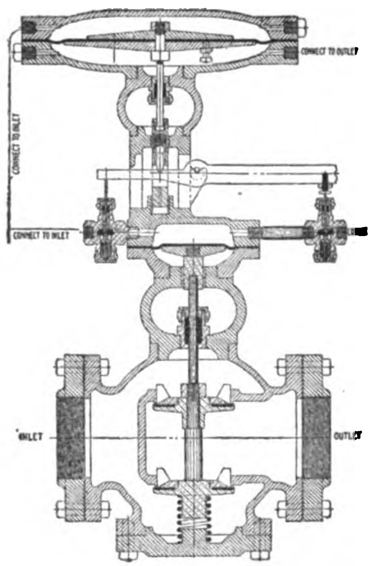
It may be measured in pounds, inches of mercury or inches of water pressure. In the natural gas industry it is almost universally measured in inches of water.

This differential pressure bears a known relation to the velocity of the flowing gas, hence from the measured differential pressure can be computed the velocity and quantity of the gas passing through the orifice.

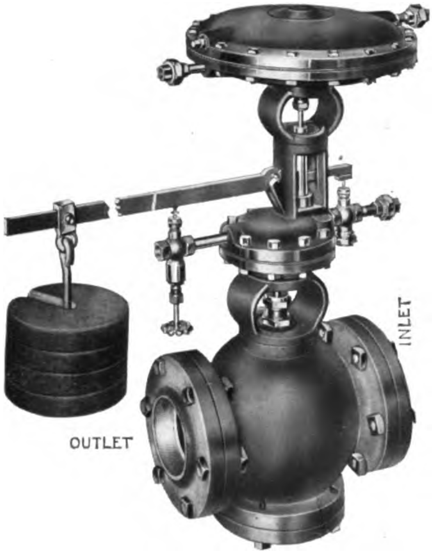
The relation of the velocity of flow through the orifice to the differential pressure is found in the law of falling bodies where the velocity of the falling body in feet per second = $\sqrt{2gh}$, where g = the acceleration due to gravity or 32.17 ft. per second and h = the height in feet from which the body fell. From this law it has been mathematically proven and demonstrated by experiment that for gas flowing through an orifice, or similar meter, the velocity in feet per second = $\sqrt{\frac{2g \times 62.3 \times H}{12W}}$

where

62.3 = weight per cu. ft. of water.
H = differential pressure in inches of water.
W = weight per cu ft. of gas.



Wrinkle No. 112. (Fig. 3B.)



Wrinkle No. 112. (Fig. 3A.)

From the above reasoning it is evident that the velocity varies as the square root of the differential pressure or the differential pressure varies as the square of the velocity.

Having a recording instrument of any fixed size for the purpose of recording the differential pressure it is desirable to limit the operation of the meter so that the record occupies but 75% or even less of the available space. With instruments capable of recording pressures of 0 to 100 inches, which are commonly used, it is desirable to keep the record between 10 and 70 inches. This limiting of the record space directly affects the range of volume of the meter.

Frequently where gas is measured for city consumption the range of flow varies from one to twelve with different seasons of the year. To affect such a measurement with orifice meters it is necessary to have a number of meters and provide means of turning them on and off in conformity with the changes of flow. This is ordinarily performed by attendants but to avoid this expense the differential relief valve described

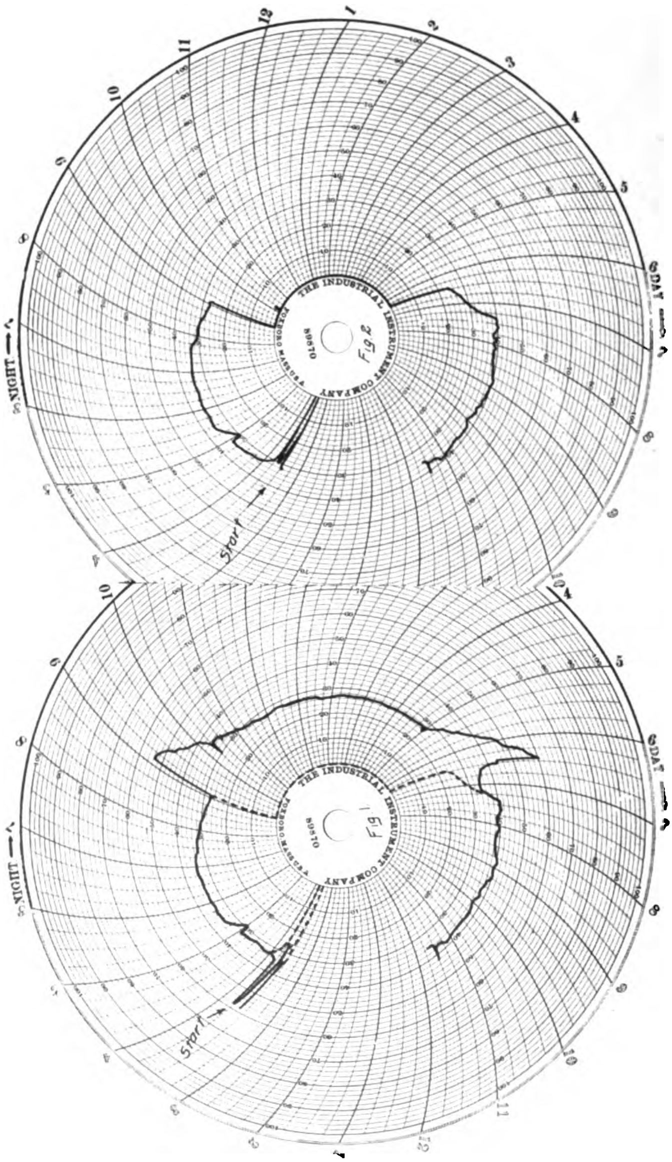


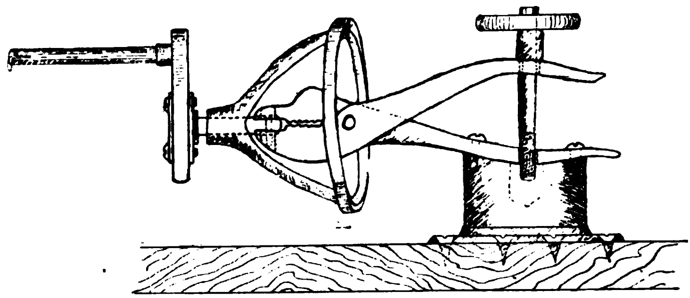
Fig. 1. Wrinkle No. 112. Fig. 2.

herewith was developed. A cut showing the detail section of the valve is shown in Fig. 3A. The general appearance is shown in Fig. 3-B.

This valve is of the positive opening type controlled by gas pressure which is in turn controlled by the balancing of forces between a differential diaphragm and weighed lever. The motion from the weighted lever is transmitted to a pair of pilot valves, one of which admits gas to the main valve diaphragm opening the main valve. The other valve is an exhaust valve for the same chamber.

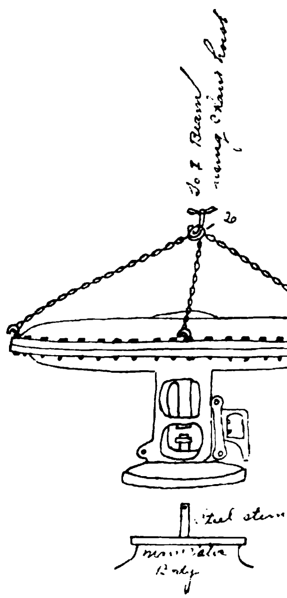
The differential relief valve is placed in the line embodying the second or other additional meters and so connected with the first meter that it is controlled by the volume of gas flowing through it. viz. differential pressure. When the differential pressure on the first meter reaches a predetermined maximum, the weighted lever is unbalanced causing the inlet pilot valve to open. This admits pressure to the top of the main valve diapragm and opens the main valve. The second meter is thereby put into operation, and the increased orifice area decreases the differential pressure on the two meters. The two continue to operate until the volume increases to such an extent that the differential pressure again reaches the maximum. A third meter is turned on in the same manner as before. If, however, the volume should decrease, the automatically controlled meters are shut off in reverse rotation, leaving the pilot meter only in service.

Two charts, Figs 1 and 2 show a 24-hour record of a two-meter installation for such automatic control. It will be noted that the second meter shut off at 9:05 P. M. when the differential pressure decreased to 27″. It was turned on again in the morning at 6:25 A. M. when the pilot differential pressure reached 61″. Chart Fig. 1 shows meter record of pilot meter and Fig. 2 shows chart from the automatically controlled meter. Superimposed upon Fig. 1 chart is a dotted line correspending to the record of Fig. 2.



Meter Cage Vise
J H Schalck, Mfrs Lt & Ht Co, Pgh, Pa

Wrinkle No. 113.



Wrinkle No. 114.

Wrinkle No. 113.

METER CAGE VISE.

J. H. SCHALEK, MFRS. LIGHT & HEAT CO., PITTSBURGH, PA.

(Drawing on page 276.)

Some meter cages are made of so soft a material which allows the bearing to wear rapidly, making it impossible to replace same in a properly repaired meter without rebushing same or substituting a new cage. To remove the cage the valve pin must also be taken out and it is often a problem for contortionists to effect this and keep cool. The vise as illustrated is easily made and will hold the cage in the proper position so that a few light taps on a punch will readily drive out the valve pin.

Wrinkle No. 114.

ONE MAN CAN REMOVE DIAPHRAGM TOP.

JOHN W. LEHEW, THE OHIO FUEL SUPPLY CO., MT. VERNON, OHIO.

(Drawing on page 276.)

Make three bolt heads into hooks, for connecting chain tripod, so that diaphragm top can be removed by one man, and regulator can be repaired without injury to the steel stem. By using a chain hoist, ¼ ton, making tripod long enough for all sized tops.

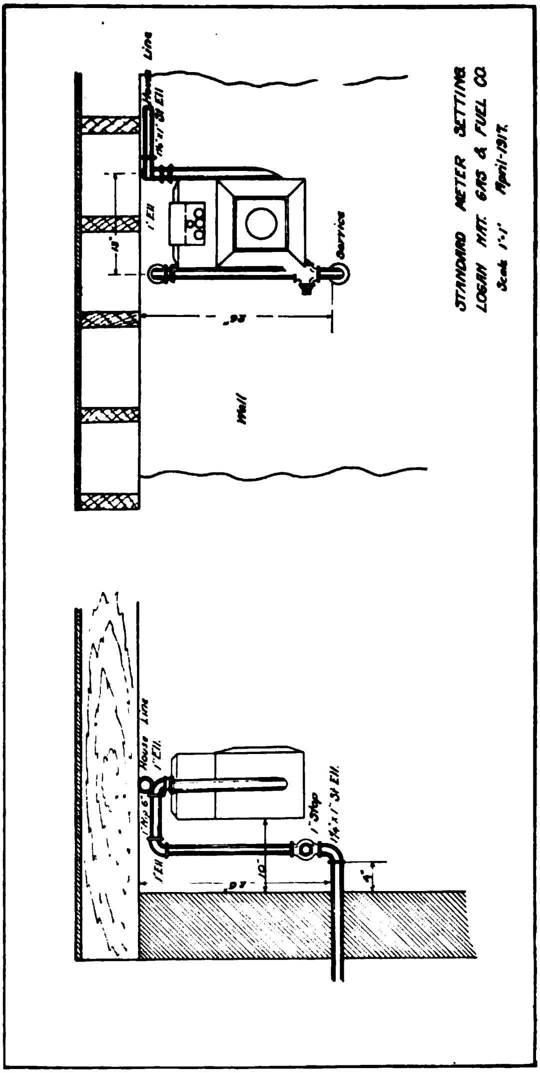
Wrinkle No. 115.

STANDARD METER SETTING.

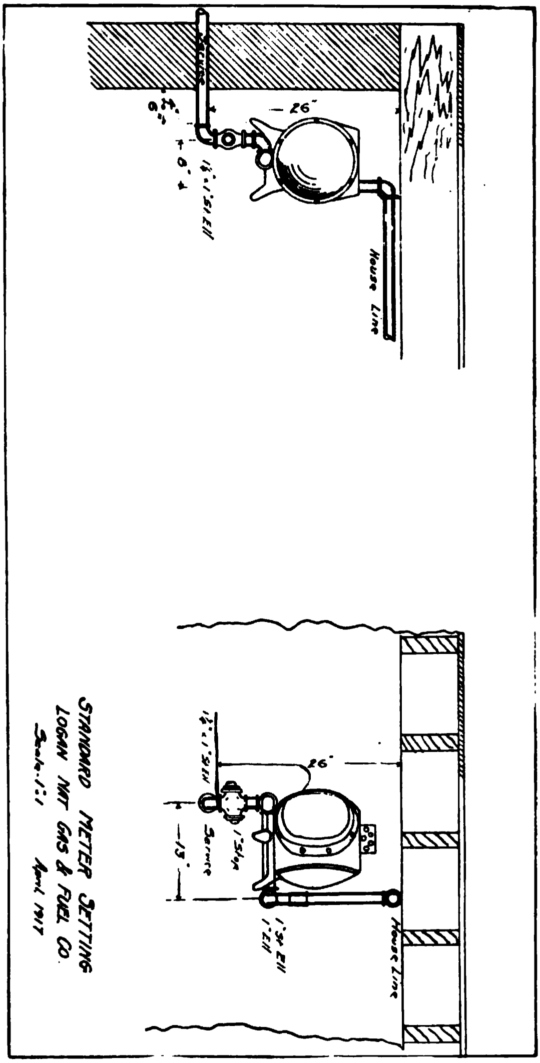
W. A. ASHLEY, SUPT. THE LOGAN NATURAL GAS & FUEL CO., CHILLICOTHE, OHIO.

The object of this drawing is to make a standard for meter setting. A copy of which would be furnished to each fitter, who is doing this kind of work. By following the outlines specified you can connect the following sizes of meters:

3 — Light)
5 — ")
10 — ")
20 — ")



Wrinkle No. 115.



Wrinkle No. 115.

By reversing the risor from left to right you can set a Tobey or Westinghouse meter by making a few minor changes of fittings.

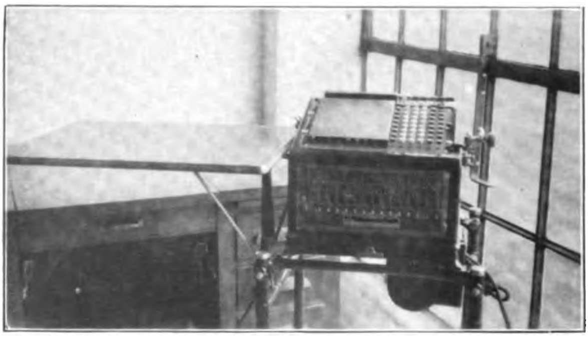
This would be a great saving to the gas companies in labor and material and would be a help to the fitter as well as to the party who makes the inspection.

Wrinkle No. 116.

MAKING A 15 BANK ADDING MACHINE INTO ONE OF SIX BANKS.

C. C. PHILLIPS, THE OHIO FUEL SUPPLY CO., COLUMBUS, OHIO.

One of our adding machines is a 15-bank machine. The greater part of our straight addition is made up of numbers of five and six digits. To increase speed and decrease confusion, we have had a cover made for the first nine columns of this machine which can be put on or removed in a second and which



Wrinkle No. 116.

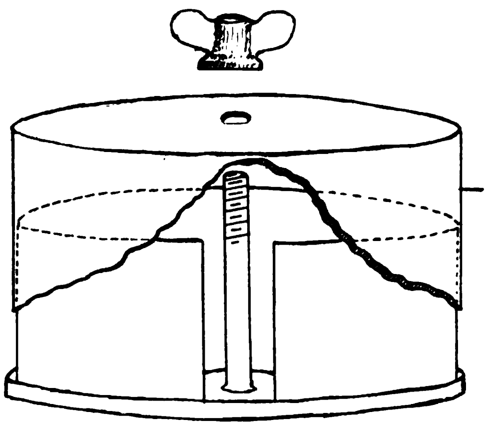
practically changes the bulky 15-bank machine to a small one of six columns. The cover is used as a shelf upon which the work is held while operating the machine, thus bringing the work close to the keyboard. When addition of larger numbers is desired, or when multiplying, the cover is set aside.

Wrinkle No. 117.

MOISTURE-PROOF CONTAINER FOR RECORDING GAUGE CHARTS.

J. H. SCHALER, MFRS. LIGHT & HEAT CO., PITTSBURGH, PA.

Recording gauge charts should be kept dry. Moisture has a tendency to make the ink "crawl" and blur due to the swelling of the sizing and the capillary attraction of the ink in the moistened fibers of the paper. The container shown in drawing is a



Moisture Proof Container for Recording Gauge Charts
J.H.Schaler, Mfrs Lt & Ht Co, Pgh, Pa.

Wrinkle No. 117.

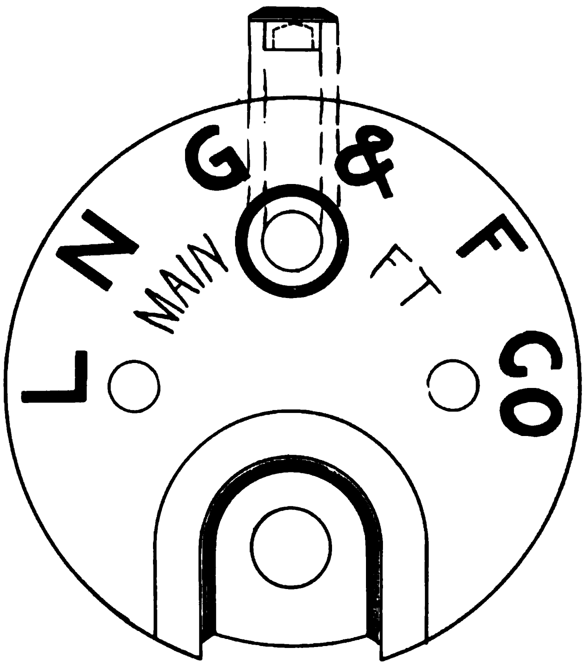
remedy for this trouble and may be constructed of 16-gauge sheet iron, terne or galvanized. A rubber gasket on the bottom edge and one under the wing nut will make this an ideal container for gauge charts for use in regulator pits or other places where water and moisture is excessive.

Wrinkle No. 118.

STAMP THE NUMBER OF FEET OF PIPE IN EACH SERVICE.

W. A. ASHLEY, SUPT. THE LOGAN NATURAL GAS & FUEL CO.,
CHILLICOTHE, OHIO.

This drawing shows a curb box top with a button made of brass attached thereto. On this button is stenciled the number of feet of pipe put in any given service.



Wrinkle No. 118.

The number of feet of pipe is placed on this button by the fitter when he cuts out the pipe for the service.

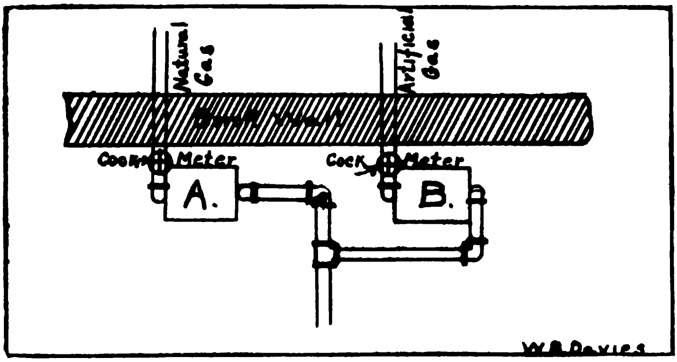
The object of which enables you to find the exact location of the main line should you have an occasion to locate the same. It would also be a great benefit in locating fittings on intersections of the different streets which is a great help in making an inventory of a plant.

Wrinkle No. 119.

PRECAUTION NECESSARY IN CITIES WHERE TWO GAS COMPANIES ARE IN OPPOSITION TO ONE ANOTHER.

W. B. DAVIES, UNITED GAS CO., ST. CATHARINES, ONTARIO, CANADA.

Sketch shows lay out of natural gas meter A and artificial meter B. On account of the low pressure of both during the cold weather, owner of building tried to use both simultaneously and found to his sorrow that the gas from the natural gas sys-



Wrinkle No. 119.

tem passed through the artificial meter and into the artificial line, a very liberal policy on the owner's part for his bill with the natural gas company had increased 200% greater than his usual monthly statement.

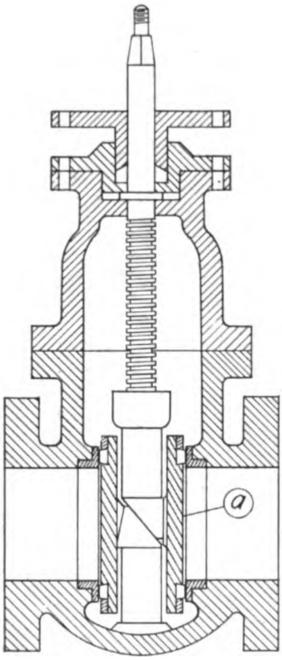
Where such conditions exist, advise consumers not to operate these two gases simultaneously.

Wrinkle No. 120.

"IMPROVED DISC FOR GATE VALVES."

H. P. ZIESCHANG, THE OHIO FUEL SUPPLY CO., COLUMBUS, OHIO.

The cut shows a gate valve in which the disc "A" carries a rubber ring "B" held in place by a follower ring "C". The rubber ring is to be made from some of the compositions which



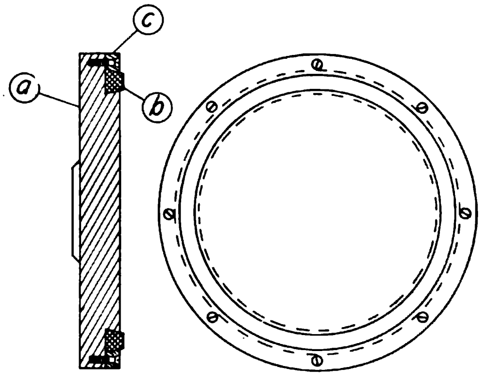


Fig 2

Fig. 1

Wrinkle No. 120.

have been so successful as gaskets for pipe line couplers, such as Paranite C or Goodrich 19. The compressibility of this rubber will make it possible to obtain tight closing of the gate even under bad conditions of grit, etc.

To prevent the sliding of the rubber ring over the seat face the wedge arrangement is to be of the type in which the closing movement is along the axis of the pipe.

Wrinkle No. 121.

TABLE SHOWING THE ACCURACY OF A GAS METER ON VERY LIGHT PRESSURES.

W. B. DAVIES, UNITED GAS CO., ST. CATHARINES, ONTARIO, CANADA.

I have seen many men in connection with local distribution offices who were absolutely ignorant and some rather skeptical

regarding the accuracy of the gas meter on low pressure gas, consequently I have compiled this table showing the various pressures in inches of water and ounces, the percentage of error for these various pressures and the time for the meter to pass 10 cu. ft. under these various pressures.

The meter tested was a Sprague meter with 1" outlet and the two tests consisted of one with full opening and the other with ¼ opening.

For a pressure of 0.3 ounce in both cases, the meter was 1.52% slow and fast above this pressure with little deviation as to the actual percentage.

The column showing the duration of time in minutes and seconds for 10 cu. ft. to pass through the meter is very interesting.

Pressure Inch Water	Pressure Oz.	Quantity Meter	Quantity Tank	Per Cent Error	Time to Pass 10 Cu. Ft. Gas
		Outlet 1" Opening			
0.5"	0.3	10.00 cu. ft.	9.85 cu. ft.	+1.52	6'—30"
1.25"	0.73	10.00 "	10.08 "	—0.79	3'—40"
1.75"	1.03	10.00 "	10.09 "	—0.89	2'—40"
2.375"	1.39	10.00 "	10.06 "	—0.60	2'—20"
2.875"	1.69	10.00 "	10.06 "	—0.60	2'—05"
3.375	2.00	10.00 "	10.09 "	—0.89	1'—55"
4.000	2.30	10.00 "	10.09 "	—0.89	1'—45"
5.200	3.00	10.00 "	10.14 "	—1.38	1'—35"
		Outlet ¼" Opening			
0.5"	0.3	10.00 cu. ft.	9.85 cu. ft.	+1.52	9'—05"
1.25"	0.73	10.00 "	10.08 "	—0.79	5'—20"
1.75"	1.03	10.00 "	10.13 "	—1.28	4'—03"
2.375"	1.39	10.00 "	10.14 "	—1.38	3'—35"
2.875	1.69	10.00 "	10.16 "	—1.57	3'—15"
3.375	2.00	10.00 "	10.15 "	—1.48	3'—03"
4.000	2.30	10.00 "	10.13 "	—1.28	2'—50"
5.200	3.00	10.00 "	10.16 "	—1.57	2'—30"

Wrinkle No. 121. W. B. D.

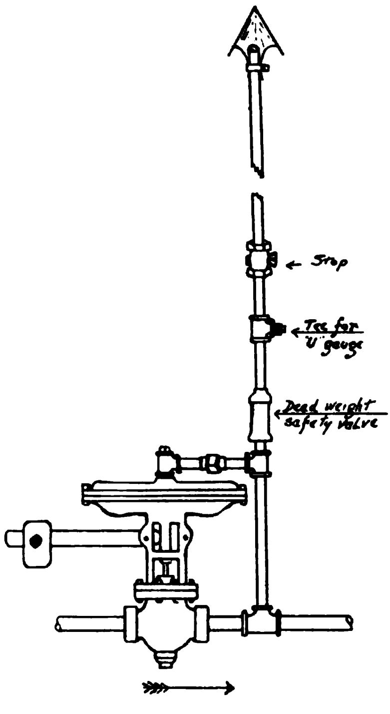
The information given in this table is absolutely essential to all employees of companies, who have the gas shortage condition confronting them during severe weather.

Wrinkle No. 122.

METHOD OF DETECTING LEAKING "DEAD-WEIGHT" SAFETY VALVES WHILE IN SERVICE.

J. H. SCHALEK, MFRS. LIGHT & HEAT CO., PITTSBURGH, PA.

Much gas is lost by leakage of dead weight safety valves and a method or means of knowing when these valves need



A method of detecting leaking safety valves while in service.
J. H. Schalek.
Mfrs. Lt & Ht Co
Pittsburgh, Pa.

Wrinkle No. 122.

regrinding is of great importance. Some reclaimed valves have been found leaking at the rate of ten cubic feet per hour. As shown in the drawing, the vent pipe has the added equipment of two nipples, one-quarter inch outlet tee, and a stop. When testing for leakage through the safety valve a 6″ "U" gauge is screwed to the tee and the stop closed. Any leakage will then be indicated by the difference in the water levels of the "U" gauge. The cost of the extra fittings will be repaid in less than a year's time in gas saved. The regulator man, carrying with him a 6″ gauge, can test a valve in about five minutes.

Wrinkle No. 123.

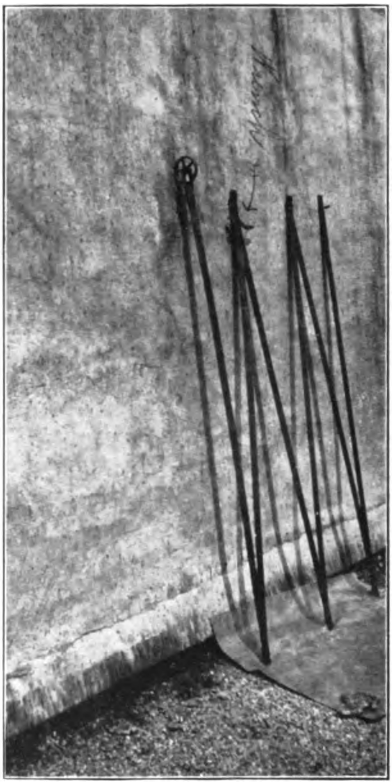
RULE FOR MEASURING PIPE WHEN PILED.

A. L. SCHNEIDER, PITTSBURGH & WEST VIRGINIA GAS COMPANY, CLARKSBURG, W. VA.

The photograph shows a steel folding rule for measuring casing, pipe or tubing, especially when piled where it would require two or three men to tear down and repile in order to get a correct measurement. With this rule one man can measure in half the time that it would take two or three men to do.

It comprises six sections, each four feet two and a half inches long, riveted together so that when extended one section will overlap the other two and a half inches, permitting a bolt to be put through to keep the rule from folding when in use. They are fastened with the screw-driver wrench as seen in the picture. The end to go through the joint has a pin one inch long and a quarter of an inch thick riveted on, projecting on the blank side of the rule. When measuring casing the rule is put inside the joint, pin end forward and pushed through joint until the pin is out of the other end, then pulled back slightly until the pin stops against the end of the joint.

Commencing at fifteen feet from the pin, the rule is graduated in half and inch lines marked with a file, then stamped with small figures at the inch marks and larger figures designating the feet. This of course is on the upper side, the pin projecting from the lower side. The wheel is to allow the end to



Wrinkle No. 123.

travel over the ground as it is withdrawn from the joint after being measured.

Material required to make this rule:

24 feet 1/8" x 1" Iron or Steel
5 1/4" x 1/2" Stove Bolts
6 1/4" x 1/2" Rivets
2 1/4" x 2" Rivets
1 1/2" x 3" Wheel
1 Screwdriver-wrench.

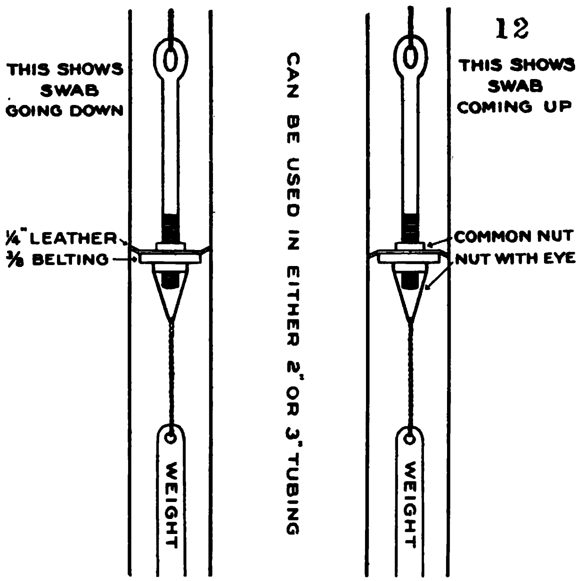
Wrinkle No. 124.

THIS SWAB DOES THE WORK AND SAVES MONEY.

A. E. BOYD, DISTRICT SUPT. THE OHIO FUEL SUPPLY COMPANY, ASHLAND, OHIO.

This sketch shows a new swab gotten up by us. Sketch shows swab in operation going down in tubing and also coming out.

This is a simple arrangement made from 5/8" round iron about one foot long with an eye made in top end for wire line to fasten into. The lower end of iron is threaded for about



Wrinkle No. 124.

three inches, with a common nut screwed on first, then we have another nut tapped out and made in the shape of an eye. A round piece of 1/4" leather and a piece of 3/8" belting is placed between these nuts. The belting under and the leather on top are shown in sketch. The eye nut on bottom serves two purposes; the one purpose for attaching weight and the other is

when you want to place new rubbers and leathers, all that is necessary to do is unscrew it.

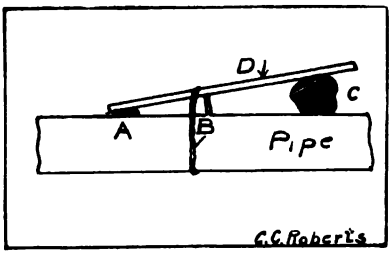
We had a great deal of trouble in getting something to take the place of soft rope swabs which the well men insisted on using. They insisted they could not swab a light well with a common leather swab, but we found these swabs will clean a very light well and it is saving the company a lot of extra expense by eliminating the fishing jobs which were caused by using rope swabs, because they would get fast and the swab line would be broken causing a fishing job. We have not had a single bad job with these swabs as yet and are able to keep wells in better shape.

Wrinkle No. 125.

TEMPORARY METHOD OF STOPPING LEAKS.

C. C. ROBERT, SUPT. SOUTHERN ONTARIO GAS CO., ONTARIO, CANADA.

Line walkers in making their rounds often discover small leaks, which they are unable to fix because of their inability to carry tools and fittings, consequently can prevent temporarily loss of gas by the following method until they return with necessary equipment.



Wrinkle No. 125.

A—represents the hole in pipe over which is placed a piece of rag or rubber.

B—may be a piece of wire, rag, rope, wrapped around pipe and stick.

D—a piece of wood or stick.

C—a small rock.

By forcing rock "C" towards point "A" under the stick the pressure at "A" can be made great enough to compress the rag over the hole sufficiently to prevent loss of gas.

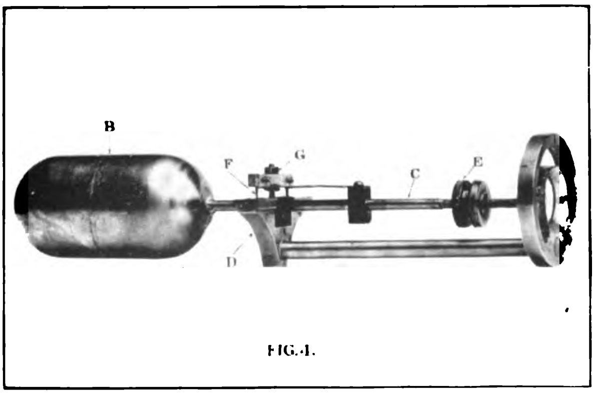
Wrinkle No. 126.

APPARATUS FOR THE ACCURATE DETERMINATION OF SPECIFIC GRAVITY OF GASES.

T. H. KERR, ENGINEER, AND E. F. SCHMIDT, ASSISTANT ENGINEER, THE OHIO FUEL SUPPLY COMPANY, COLUMBUS, OHIO.

Since the orifice meter has become so widely used for the measurement of high pressure natural gas, many different types of apparatus for the determination of specific gravity, embodying the principle of effusion have been placed on the market So many sources of error uncontrollable by human agencies have been encountered that, except under ideal laboratory conditions the most improved type of effusion apparatus has been found very unreliable.

At the instigation of several gas companies the Bureau of Standards at Washington, D. C., investigated all the types of specific gravity apparatus obtainable. Their investigations resulted in the abandoning of the effusion type and the adoption of a modified type of the weighing instrument. In the Technologic Paper of the Bureau of Standards, No. 69, entitled "A



(Fig. 4) — Wrinkle No. 126.

Specific Gravity Balance for Gases," the investigations and results of the Bureau can be found.

(Fig. 1)—Wrinkle No. 126.

We desired an instrument for either laboratory or field use and developed the one shown in Fig. 1. It has the combined advantages of stability and lightness, weighing only fifteen

pounds complete with carrying case. It consists of a water jacketed balancing chamber, a metal balance beam, a U gauge filled with mercury for measuring pressures, a vacuum pump, drying tubes for drying the air, and a tripod on which the instrument is mounted. In addition to the above a barometer is also necessary for the determination of absolute pressure.

Much experimenting was done before the apparatus shown was finally produced. The balance chamber was cast in one piece of aluminum and screw caps which were provided with plate glass windows were fitted to either end, thus allowing ample light for observing the position of the beam. Most of the aluminum castings, however, proved to be porous and in order to make the balance chamber air tight, a piece of cold drawn steel tubing was fitted inside and machined so that with the end caps drawn up against soft rubber gaskets, an air tight joint was provided. Much experimenting was also done to make a substantial and sensitive balance beam which was finally constructed as shown in Fig. 2. It consists of an air tight bulb (B) of spun brass, counter-weighted with adjustable balancing weighs (E). The bearing points (F) are also adjustable (G), allowing the center of gravity of the beam to be raised or lowered, thus providing a control of the sensibility. The needle points rest on glass bearings which arrangement was adopted by the Bureau of Standards as being practically without friction. The bearings are made so as to give the beam neither lateral or longitudinal motion, assuring a constant position during a determination of gravity.

The method used in making a test is as follows: The beam is adjusted so that it will come to equilibrium in atmosphere with the counterweight end slightly below a horizontal plane through the bearing points. In this position a vacuum is required to bring it to a level position which position is affected by bringing into alignment the cross hair mounted permanently on glass and the line on the end of the balance beam. The air that is allowed into the chamber when making this balance must be drawn through some drying agent assuring dry air. The vacuum reading is then observed on the U gauge. This should

be repeated and checked. The balancing chamber is then purged of air and the gas allowed to fill it to a pressure sufficient to bring the beam to the same position of equilibrium again. The pressure is then observed on the U gauge. These pressures are then reduced to absolute pressure, knowing the barometric pressure at the time of making the test. The specific gravity of the gas is the quotient of the absolute air pressure divided by the absolute gas pressure. (Air being 1).

A typical case is given below.

Barometric Pressure...... 755 mm.
Balancing Pressures—
Air...... —187 mm.
Gas...... +126 mm.

$$\text{Specific Gravity} = \frac{755 - 187}{755 + 126} = .6447$$

The development of this instrument has made the accurate determination of specific gravity more practical and has thus made it possible to measure high pressure natural gas to a degree of accuracy seldom heretofore attained.

Wrinkle No. 127.

A METHOD OF EXTINGUISHING BURNING GAS LEAKS ON MAIN LINES.

FRANKLIN L. KELLOGG, FIELD FOREMAN, ONTARIO GAS COMPANY, HONEOYE FALLS, N. Y.

When a leak in a buried gas line has been ignited and allowed to burn for some time, it will be noticed that wherever the flame issues from the ground, the ground and surrounding material will attain a very high temperature. By deluging this highly heated material with water, a cloud of steam will arise and smother the flame of burning gas. Where the pipe line is above ground, it is sometimes advisable to pile stones or other refractory material about the flame and wait for same to heat, before applying the water, in order to have enough heated material to vaporize the same.

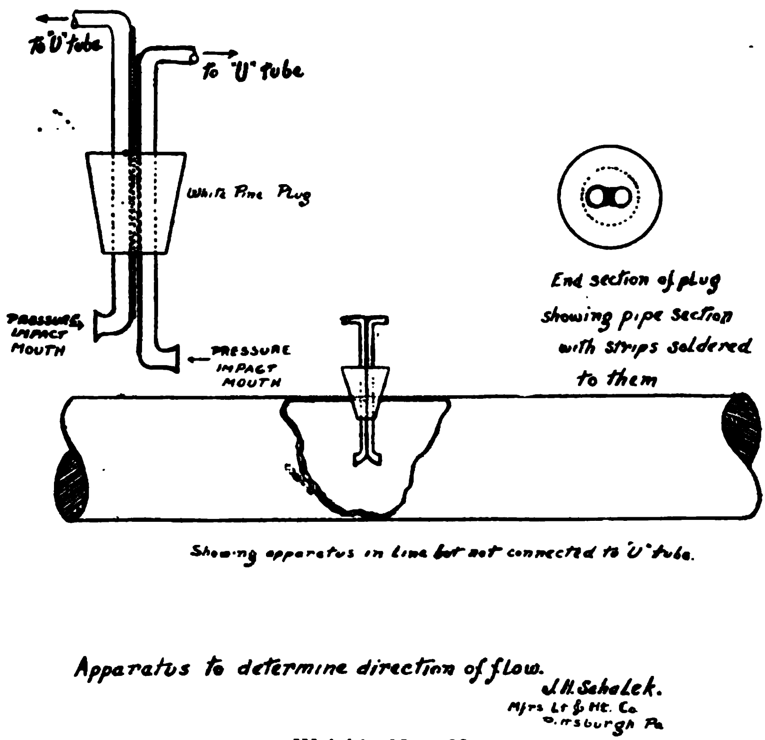
The size of the fire will determine the proper treatment. The writer has used the above method in several cases and has found it to be very simple and satisfactory.

Wrinkle No. 128.

APPARATUS TO DETERMINE DIRECTION OF FLOW.

J. H. SCHALEK, MFRS. LIGHT & HEAT CO., PITTSBURGH, PA.

In belted systems and where the main line is fed by wells situated in localities opposing each other, with reference to the main line, it is often desirable to know which way the gas is flowing. The principle of the apparatus is identical with that of the Pitot tube. The impact mouths should be placed as near the center of the main as possible. The impact mouth facing



Wrinkle No. 128.

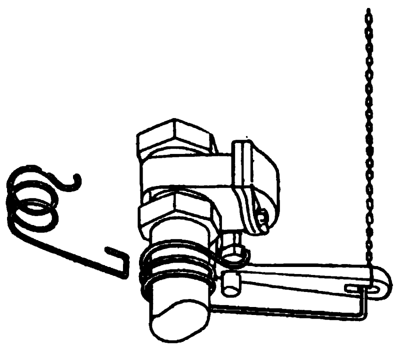
the direction of flow will show a greater depression in the liquid in its arm of the "U" gauge than the down stream impact mouth due to the fact that both the dynamic and static pressure is recorded while the down-stream mouth records only the static pressure and which is also lessened by suction where the speed of the gas is great. The greater the speed of flow the greater is the differential pressure. By reason of the sliding tubes it is possible to insert apparatus in a smaller hole than would otherwise be the case.

Wrinkle No. 129.

USE SPRING IN PLACE OF WEIGHT ON VALVES.

T. J. THATCHER, NEW BUSINESS DEPARTMENT, THE OHIO FUEL SUPPLY CO., COLUMBUS, OHIO.

The usual method for making a lever valve so that it will seat is to put a chunk of lead or other weight on the end of the valve arm.



Wrinkle No. 129.

We have found that a spring of good steel wire can be made and attached to a valve as shown in cut. Using a spring is a much surer way of making the valve seat, makes a neater appearance and is particularly valuable when used with a thermostat on house heating jobs.

Wrinkle No. 180.

FIVE WRINKLES FOR OPERATION OFFICES.

JOHN M. CRONIN, COLUMBIA GAS AND ELECTRIC COMPANY, CINCINNATI, OHIO.

The enclosed "Wrinkles" have been a quick and comprehensive means, in our office, of having at hand information that is sought almost daily in all "operation offices."

Wrinkle No. 1—Operation Calendar. This calendar permits any one to determine the number of locations and the progress in drilling, the total number of wells drilled, purchased, abandoned and repaired for any month. The report, of course, is made up to the last of each month.

Wrinkle No. 2—All gauge reports are flashed from the field. As soon as these reports are received, the gauge in cubic feet is put upon the card and when the gauge slip is received the card is checked off. The use of this card is twofold in its purpose in as much as it is a check on the gauges taken of every well and it is something that you can get to in a hurry to ascertain the size of one or a group of wells recently completed.

Wrinkle No. 3—The large gas companies, as a rule, have well pockets into which are placed certain information required in the drilling of each well. To obviate the necessity of looking through your well pockets to see if you have received certain information, this card is used and when the information is received, it is checked off on the card and a glance across the card will show in a moment the information needed to complete the file.

Wrinkle No. 4—"Individual Well History." A card is given for each well upon the location of same and as weekly reports are received from the field, the information is recorded on the card. Upon the completion of the well the card is taken out of the card index and filed in the well pocket.

Wrinkle No. 5—"Defective Well Card." As soon as a well is reported defective a card is made up showing the original open flow, the original rock pressure and the defect. When repairs are begun on the well, record is kept as the weekly re-

No. 1. OPERATION REPORT. 1917.

1917. Month.	Locations.	Rig and Bldg. Completed.	Wells Drilling.	Wells Completed.	Total.	Total Wells 1st of Month.	Drilling during Month.	Purchased during Month.	Total Wells.	Less Dry Holes.	Less old Wells Abandoned.	Total Wells Last of Month.		Wells Repaired and Drilled Deeper.
Jan.	275-276-277 278-279-280 281-282	242-243 244	261-263 264	272-287 288	16	202	8	269-270	207	272	—	206		35-62
Feb.														
March ..														
April ...														
May														
June														
July														
Aug.														

Wrinkle No. 130.

No. 2.

Well	Big Lime.		Big Injun.			Berea.		Before Shot.	After Shot.				Size Shot.	Rock.	Before Tubed.	After Tubed.	
257	—	—	1,200,000	1,415,000		2,000,100	2,500,000	2,100,000	4,200.000	3,900,000	3,600,000		Qts. 60	570	3,500,000	3,600,000	
258																	
259																	
260																	
261																	
262																	
263																	
264																	
265																	
266																	

Wrinkle No. 130.

No. 3.

	Title Request.	Opinion Law Dept.	Location Report.	Gas Contract.	Drilling Contract.	Rig Contract.	Surface Cl'ms.	Shooting C. & F.	Plugging C. & F.	Well Card.	Material Report.	Formation Report.		Refusal of Oil	Platted.	Bkkpr's. Dept.	O. K.'d by Bkkpr's. Dept.
257																	
258																	
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Wrinkle No. 130.

No. 4.

PROGRESS REPORT.

Well No. 286.

7- 8-16	Location	2- 3-17	Completed 2-2-17 — 1543 Total Depth.
7-15-16 7-22-16	"	2-10-17	Going to pump well. Pumping 30 bbls. per day.
7-29-16 8- 5-16	"		
8-12-16 8-19-16	"		
8-26-16 9- 9-16	"		
9-16-16 9-23-16	"		
9-30-16 10- 7-16	"		
10-14-16 10-21-16	" Road Complete		
10-28-16 11- 4-16	Moving in		
11-11-16 11-18-16	Rigging up Rigging up. Moving Tools		
11-25-16 12- 2-16	575 1.075		
12- 9-16 12-15-16	1 350 Cased 6⅝ inches		
12-16-16 12-20-16	1,437 -- cased 1,437 — 6⅝ inches Struck Oil 10 A. M., Dec. 18 — 200 barrels per day		
12-22-16	Are hauling tanks in to-day		
12-26-16 1- 5-17	Pipe Line Co. is figuring building pipe line to the well. Test shows 28 barrels per hour		
1-13-17 1-20-17	4½ bbls. per hr. produced — 3,500 bbls. up to date 1-10-17 30 bbls. per day		
1-27-17 2- 1-17	Drilling well deeper — Started to-day Got pocket drilled. Will get steel measurment tonight.		

Wrinkle No. 130.

No. 5.

DEFECTIVE WELL REPORT.

Well No. 64.

Original 2,576,400 — Rock 550 — Last Test 12-24-16. Leak in Casing Near Top Hole.
(1,480,896)

2- 1-17	Defective						
2- 8-17	Hauling Material						
2 15-17	Pulling Tubing						
2-21-17	Cleaning Out						

Wrinkle No. 130.

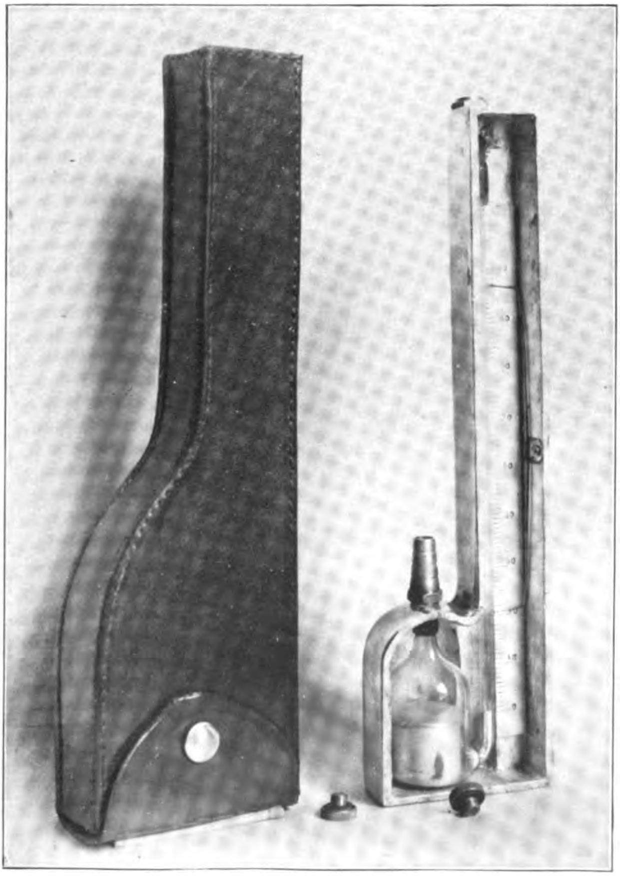
ports are received. Upon completion of repairs the card is filed in the well pocket and becomes a part of the permanent record. By the use of this card we are constantly reminded of the defective wells and the defects.

Wrinkle No. 131.

A PORTABLE TEST GAUGE.

T. H. KERR, ENGINEER, THE OHIO FUEL SUPPLY CO.

The test gauge shown in the following cut represents an improvement both as to lightness of weight and durability over



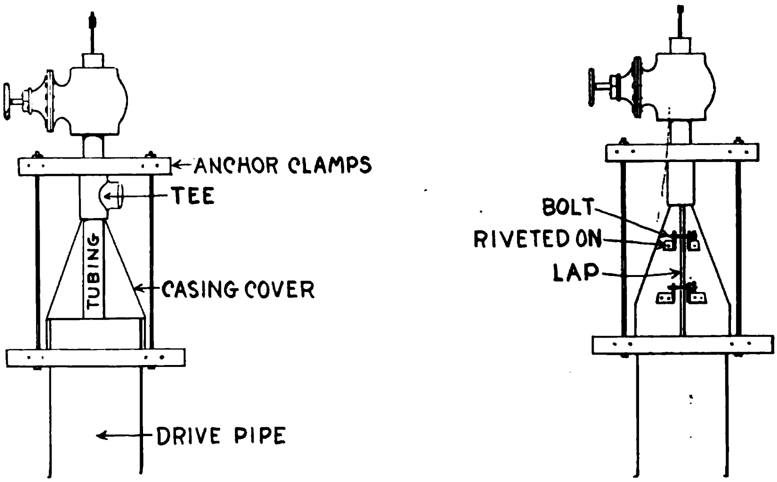
Wrinkle No 131

the gauge made by the writer shown as Wrinkle No. 111 in the 1916 Proceedings of the Association. It is also provided with screw caps making it possible to carry the gauge with the mercury contained in it. The leather carrying case is for convenience and a safeguard against breakage.

Wrinkle No. 132.

A. G. BOYD, DISTRICT SUPT. THE OHIO FUEL SUPPLY COMPANY, ASHLAND, OHIO.

When a well is left open at the top in the drive pipe and casing around the tubing it leaves a well in such shape that any one can drop rubbish, iron, etc., down inside of casing. This is very expensive to a company when they start to clean a well out on account of causing the tubing and packer to stick and often causing a pipe fishing job. A casing-head would be rather expensive for this purpose and we have tried packing rope around the tubing in top of casing, but we found this was not a success on account of it working down, then if there comes a time that we wish to "mud" a packer we are up against it.



Wrinkle No. 132.

Now I have gotten up a new wrinkle which is very cheap and it answers the purpose well. It is a simple, funnel-shape arrangement made out of galvanized iron, large enough at the bottom to fit down around the drive pipe and reduced to about the size of the tubing to fit around the tubing under the tee. A lap runs up and down with a little lug riveted on each side of the lap. At the top and bottom a bolt runs through these to draw it up tight around the tubing and drive pipe. We find this simple arrangement is very satisfactory. See rough sketch.

Wrinkle No. 133.

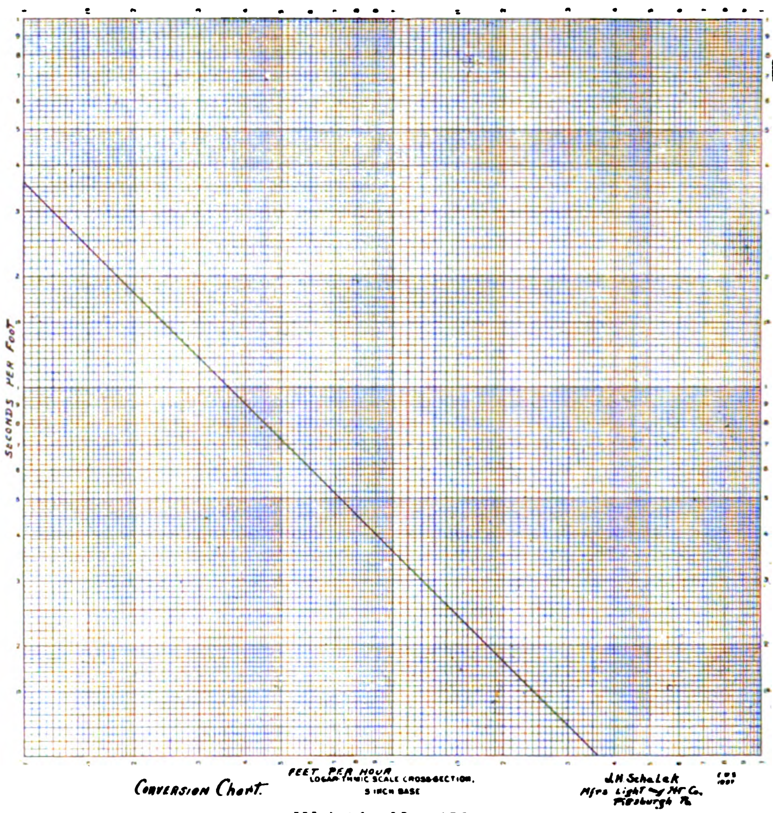
CONVERSION CHART.

J. H. SCHALEK, MFRS. LIGHT & HEAT CO., PITTSBURGH, PA.

(Drawing on page 306.)

By the aid of this chart much time and labor may be saved in estimating consumption per hour when rate per cubic foot is known or to determine the rate of flow per second when the rate of flow per hour is known. It is also useful in setting adjustable orifices when testing factory meters by the prover method. Example: What is the rate of flow per hour when one cubic foot passes orifice in four seconds? Solution: Find the figure four (4) in margin "Seconds per foot", follow line to the diagonal, follow the line at the intersection to the base "Feet per hour", which in this instance read 900 cubic feet. This chart is made on logarithmic ruled paper and it should be kept in mind that:

Tenths of seconds per cu. ft. equals thousands of cu. ft per hour.
Units of seconds per cu. ft. equals hundreds of cu. ft. per hour.
Tens of seconds per cu. ft. equals tens of cu. ft. per hour.
Hundreds of seconds per cu. ft. equals units of cu. ft. per hour.



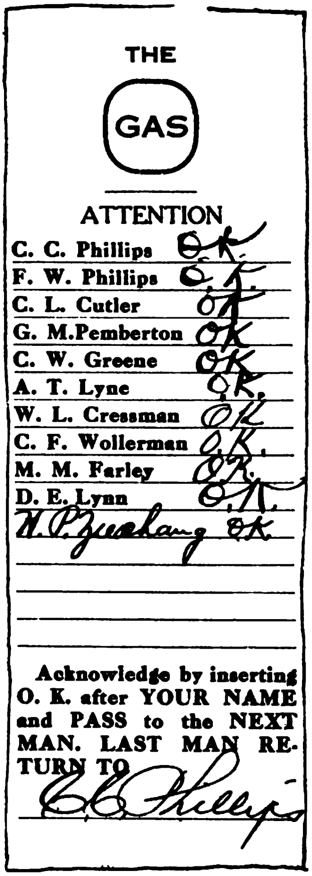
Wrinkle No. 133.

Wrinkle No. 134.

"THE GAS CIRCLE."

C. C. PHILLIPS, THE OHIO FUEL SUPPLY CO., COLUMBUS, OHIO.

Being vitally interested in all phases of the natural gas industry, this department has formed an organization for the purpose of increasing our knowledge of this business. The members each contribute $3.00 a year to cover expense of subscriptions to various gas magazines, government bulletins and


THE

GAS

ATTENTION

C. C. Phillips O. K.
F. W. Phillips O. K.
C. L. Cutler OK
G. M.Pemberton OK
C. W. Greene OK
A. T. Lyne OK.
W. L. Cressman OK
C. F. Wollerman O. K.
M. M. Farley OK.
D. E. Lynn O. K.
OK

Acknowledge by inserting O. K. after YOUR NAME and PASS to the NEXT MAN. LAST MAN RETURN TO

C. C. Phillips

Wrinkle No. 134.

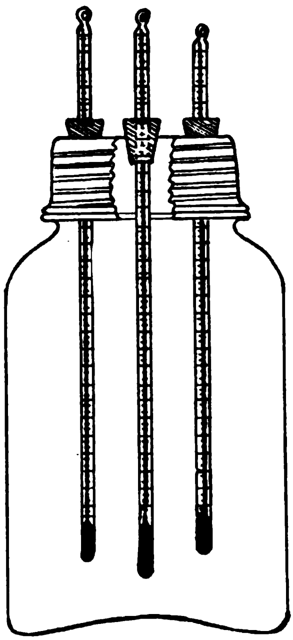
other literature of interest in this connection. All expenditures are put to a vote of the members and must have the approval of the majority. When any article of interest is read by a member it is promptly brought to the attention of all members. To be sure all members receive each magazine, bulletin or clipping, etc., the organization has had slips printed like the enclosed and nothing is filed until it has been noted and O. K.d by all the members.

Wrinkle No. 135.

THERMOMETER COMPARISON CHAMBER.

J. H. SCHALEK, MFRS. LIGHT & HEAT CO., PITTSBURGH, PA.

Although the thermometers used in proving house meters need not be of scientific accuracy, they should, however, register within a quarter of a degree of each other when immersed in a



THERMOMETER COMPARISON CHAMBER

J.H. SCHALEK – Mfrs. Lt. & Ht. Co. - Pgh., Pa.

Wrinkle No. 135.

fluid of uniform temperature. The chamber as shown in the drawing is a quart size fruit jar with holes cut in the cap for ¾″ corks or rubber stoppers. Each stopper has a hole bored

through it and small enough to grip the thermometers tightly. By filling the chamber with hot water and making a record of the thermometer readings at 10 or 15-minute intervals the unreliable thermometer can easily be found and rejected if the variation is in excess of that recommended above.

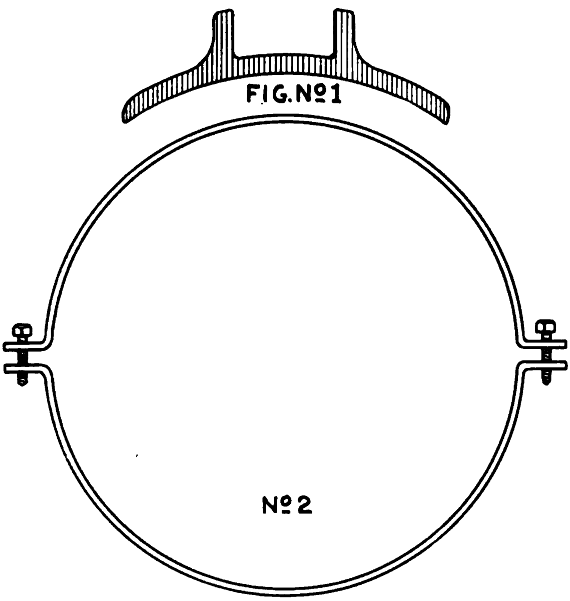
Wrinkle No. 136.

METHOD FOR REPAIRING SPLIT CENTER RING.

H. P. ZIESCHANG, THE OHIO FUEL SUPPLY CO., COLUMBUS, OHIO.

The expense of a sleeve could be done away with by using the clamp shown in these rough drawings. This clamp could be used when a center ring or a coupling is split.

Lay a piece of 1/8" gasket rubber over the leak and cover it with a piece of 1/4" steel, made with two tips that will reach above the bolts, as shown in Fig. No. 1. Then take two pieces



Wrinkle No. 136.

of band steel as shown in Fig. No. 2. The band to be put over the bolts on the coupling. Tighten on the sides, thus pulling down on the tips and this will stop the leak.

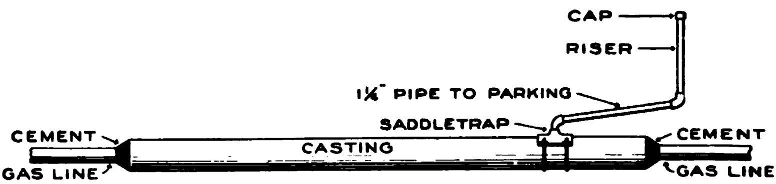
This has proven successful with our company.

Wrinkle No. 137.

LEAK DETECTOR FOR GAS LINE IN CASING.

H. H. HARRINGTON, CITIZENS' GAS & ELECTRIC CO., ELYRIA, OHIO.

Tap casing at highest point, saddle and run 1¼" line to parking in the clear, with riser and cap. By taking cap off can readily tell at any time if line is leaking in casing.



Wrinkle No. 137.

Wrinkle No. 138.

TO PREVENT REGULATORS FROM FREEZING.

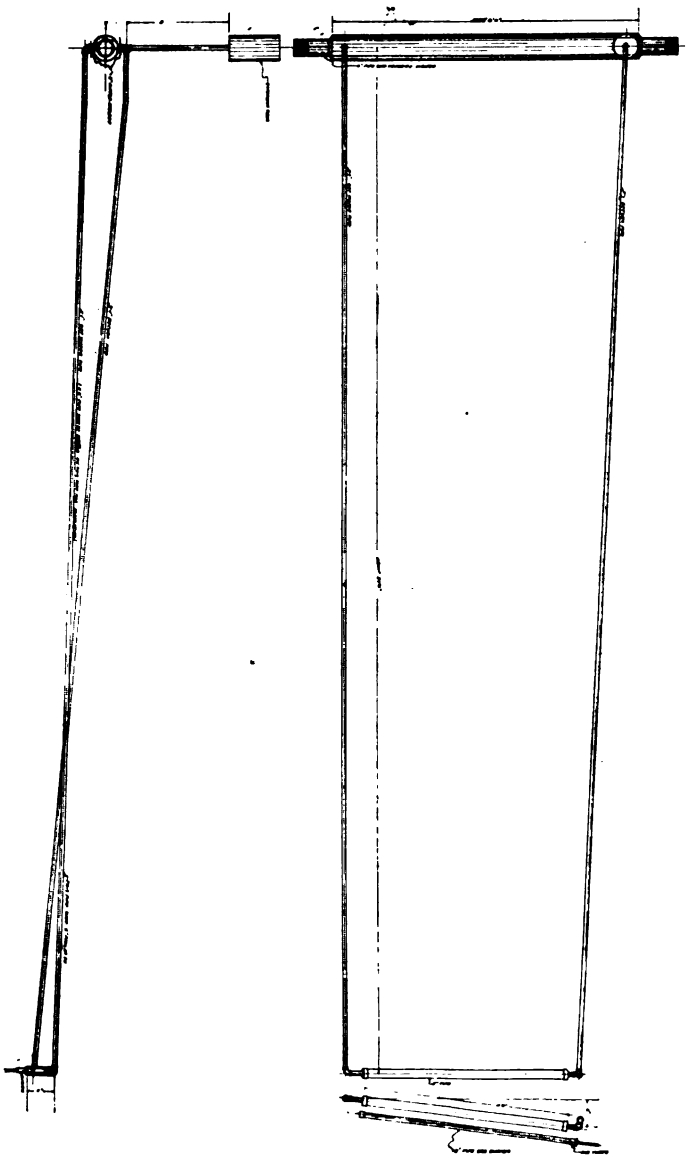
JOHN L. NEELY, MANSFIELD, OHIO.

The drawing shows a hot water heating system to prevent regulators from freezing.

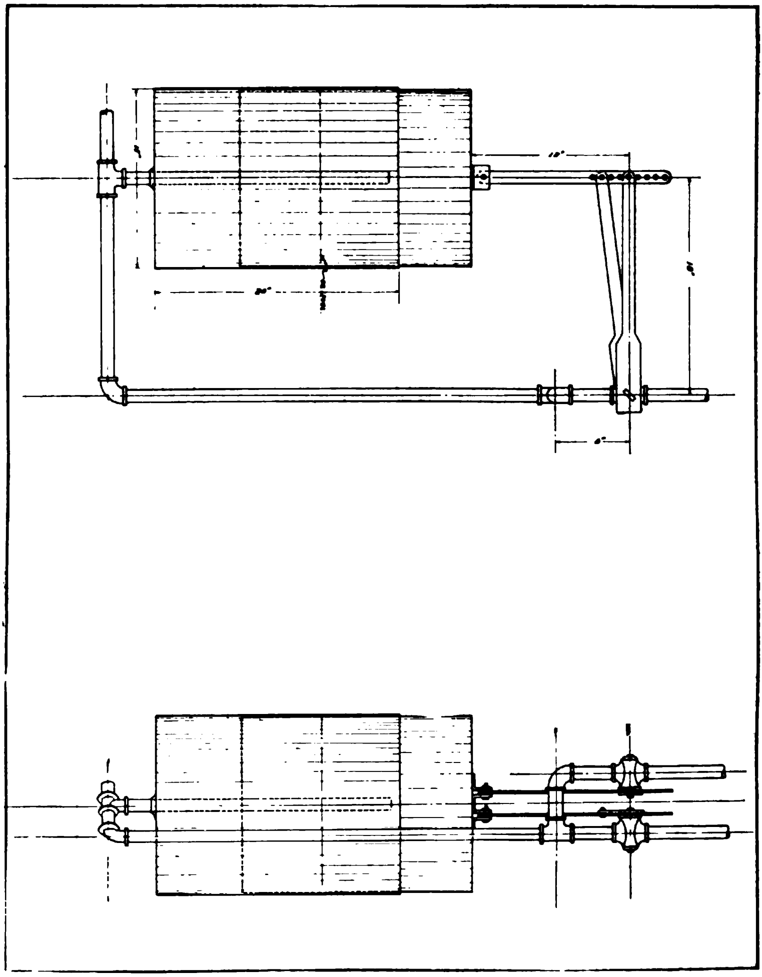
No. 1 is section of pipe attached to high pressure side of regulator, and has water jacket welded on or attached by other means.

No. 2 is a section of 2" pipe with gas burner underneath, used as a water heater. The coil can be used instead.

No. 3 is an expansion tank to be kept filled with water.



Wrinkle No. 138.



Wrinkle No. 139.

Wrinkle No. 139.

CONTROLLING TWO SOURCES OF GAS SUPPLY.

JOHN L. NEELY, MANSFIELD, OHIO.

An oil sealed gasometer with two stop cocks or valves, controlling two sources of gas supply. Valve No. 1 controls an

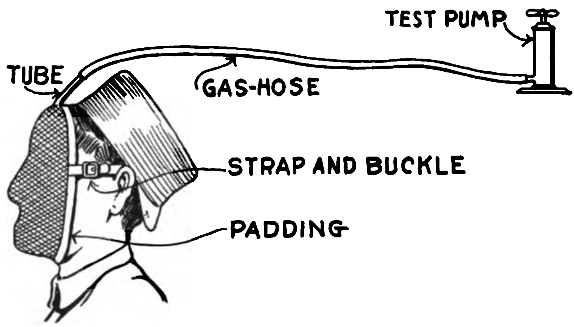
insufficient supply from privately owned gas well of higher pressure than company's mains. This valve is set by means of holes in toggle connection so that it will open one-eighth of an inch earlier than valve No. 2, which is connected to low pressure main. Thus all of pressure and volume is used from the high pressure source before the low pressure supply is automatically drawn from. This device also prevents back pressure accumulating on meter.

Wrinkle No. 140.

A HOME-MADE GAS MASK.

H. H. HARRINGTON, CITIZENS' GAS & ELECTRIC CO., ELYRIA, OHIO.

Procure wire-gauze false-face without eye holes at notion store. Sew light padding around inside of edges to fit face, solder a tin tube to top, attach strap with buckle to go around



Wrinkle No. 140.

head to hold mask in place, attach tube to test pump. No gas will penetrate gauze and in case of fire the face, eyes and lungs are protected.

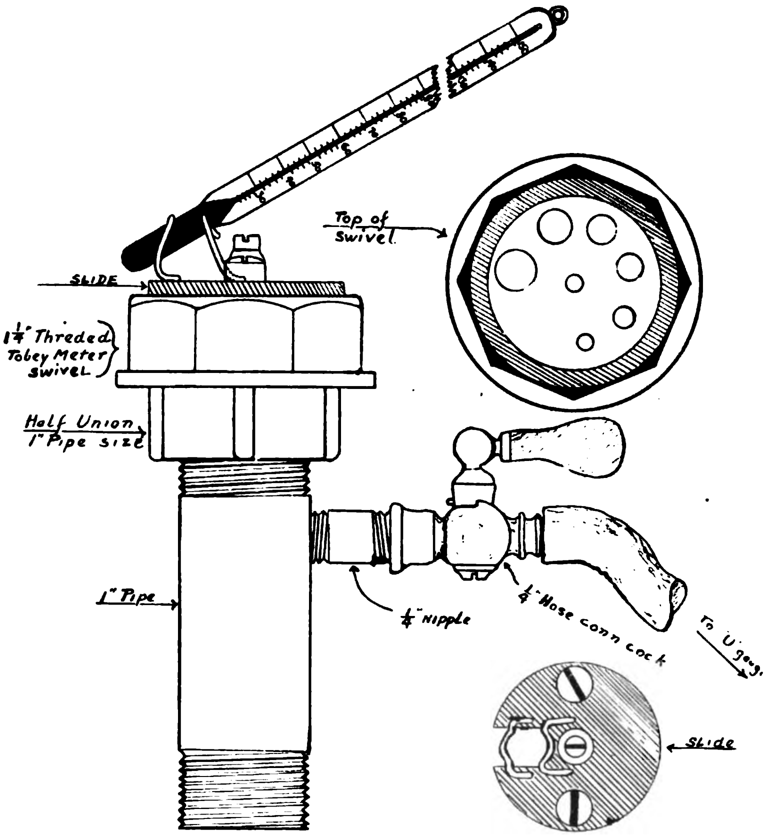
Wrinkle No. 141.

ADJUSTABLE METER PROVER CHECK.

J. J. BUCHANAN, FOREMAN METER REPAIR DEPT. MANUFACTURERS' LIGHT & HEAT CO., PITTSBURGH, PA.

I hand you herewith sketch and description of "wrinkle" adjustable meter prover check.

The adjustable meter prover check is easily made and the material required will be readily found in any meter repair shop.



Adjustable Meter Proving Check
J. J. Buchanan
Mfrs. Lt. & Ht. Co., Pgh, Pa.

Wrinkle No. 141.

The important part or feature of the check is that the disc is readily adjustable to any flow required, it also has thermometer holder, and hose cock connection on side to register the drop

pressure. We use them in our meter repair shop and have found it very convenient.

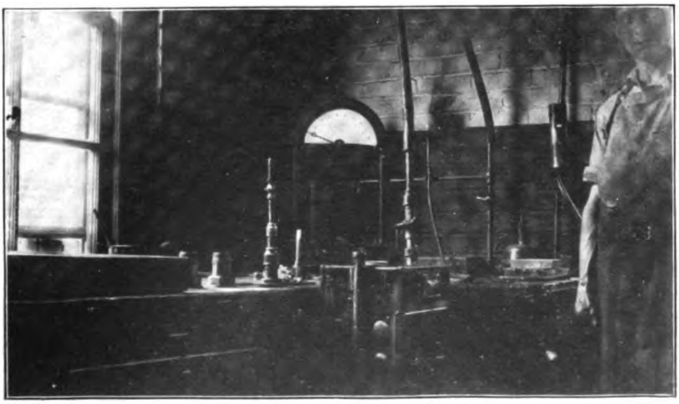
Wrinkle No. 142.

HERE'S OUTFIT FOR GASING METERS.

CHARLES E. PRATT, FOREMAN METER SHOP, EQUITABLE GAS CO., PITTSBURGH, PA.

Our outfit for gasing meters is shown in the photograph. It consists of 1 arch gauge, 1 small regulator, 1 hose line from gas line to meter, 1 nozzle for valve ports and 1 nozzle for burning out.

The small regulator is set to 3″ water pressure, by turning gas through the regulator into the meter and arch gauge, show-



Wrinkle No. 142.

ing 3″ pressure, then cutting gas off from line, the arch gauge will indicate if there is a leak in channels or diaphragms. By pressing slightly on regulator stem pressure can be run up to line pressure.

Higher pressure than 3″ is needed in testing prepayment valves. In this wrinkle the small regulator takes the place of a gasometer and a number of weights.

Wrinkle No. 143.

LOYALTY—THE ESSENTIAL POWER OF MAN.

G. R. CARPENTER, UNITED FUEL GAS CO., CHARLESTON, W. VA.

The greatest qualification a man can have is that of loyalty, yet some men will drift from it.

It requires real effort to organize a body of men to hold that principle of remaining loyal, and to have each man feel that he is not only an employe, but a part of the organization. Loyalty is nothing more than honesty.

Many times to uncover this hidden quality it requires patience and tenacity of purpose. A mass or body of men as a whole are slow to take up new ideas. The greatest building force I find is self-interest. Men are like soil to be tilled. If taken care of with touch of improvement it well pays for your trouble, but if you fail to show that interest you lose in returns.

Every man with ambition to advance should proceed on an honest and true foundation of his own merits, and to have that foremost in mind of which he aspires, and make steps for himself. Truly he is to be benefited by ideas of bigger men, but he should not try to impersonate some one else, if so, his own judgment is of less value.

A man should not be ashamed to own that he is in the wrong. There is great practical benefit in making a few mistakes and being followed up by sharp criticism. The practice of persistent loyalty shows your associates or employes your most essential purpose. With these principles you impress them with your personal interest in their welfare.

If you show interest and encourage better results, you can get them. Just as soon as men learn that you notice what they do as well as that which they do not do, you inspire ambition. Most men like a few words of praise. It is inspiring and gives them a strong mental vibration. It encourages them to take pains with their work.

Wrinkle No. 144.

SPEED IN USING BLOTTING PAPER.

M. A. RADY, THE LOGAN NAT. GAS. & FUEL CO., WELLINGTON, OHIO.

In entering readings, consumption, etc., on gas bills the time consumed in handling a blotter can be cut in half by cutting a strip from the end of a blotter the width of a finger, with a rubber band fasten same over the end of the second finger of the writing hand and with ten minutes' practice work can be turned out with speed and ease.

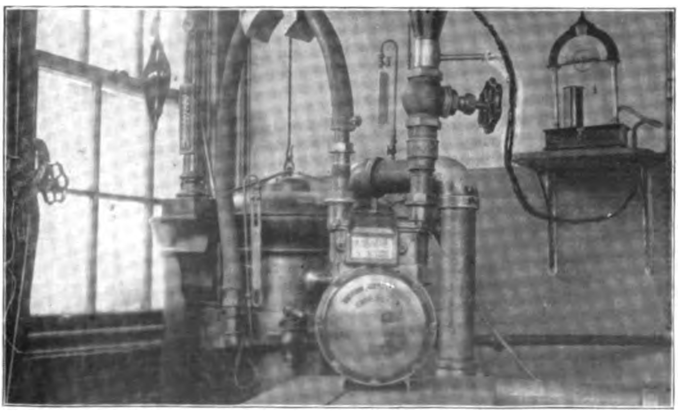
Though I have been using the above stunt for about five years, yet it may be new to some.

Wrinkle No. 145.

FLOWOMETER AND GAUGE ARRANGEMENT SAVES TIME.

CHARLES E. PRATT, FOREMAN METER SHOP, EQUITABLE GAS CO., PITTSBURGH, PA.

This photograph shows a small flowometer with orifices ranging from 5 cu. ft. per hour to 320 cu. ft. per hour. Collectively we can get 635 cu. ft. per hour.



Wrinkle No. 145.

From the flowometer there is a hose attached to Arch Gauge, on which is held 1″ water pressure. This arrangement when used for special shop tests or Public Service Tests saves time.

By removing a plug fitted in a short piece of pipe surrounding each orifice and setting Arch Gauge at 1″, you can get any volume from 5 cu. ft. per hour to 635 cu. ft. per hour, you do not have to use a stop watch.

Wrinkle No. 4-11-44.

F. H. WALKER, THE OHIO FUEL SUPPLY CO., PITTSBURGH, PA.

Wrinkle, wrinkle, Magazine,
It's a cinch it shall be seen,
That, the dope we've just been reading,
Will set our Think Tanks all a speeding.

A Youth cometh unto an Old Man saying, "I pray thee kind sir, give unto me the Secret of Satisfaction."

Behold I have been in Service unto a Gas Company for Three Hundred and Sixty-Five Days, and it seemeth unto me that in that time, surely the Authorities would see wherein they have an important Servant.

But it seemeth to be contrawise, for lo, they pass me by and notice not the work of my hands, neither do they see the results of my Thinking, and so I am in a measure disheartened.

The Old Man looketh upon his supplicant with an amused countenance and forthwith declareth unto him the Wisdom which cometh from Experience.

My son, he sayeth, arise and be of Good Cheer, for behold thy day cometh.

In like manner the things which plague thy mind did trouble me in the days of my Past, but these things are but as rungs in a ladder — to be trampled upon — for behold the Road to Satisfaction slopeth upward, and the Path thereof being strewn with obstacles like unto Damardwurk.

Mayhap thy Endeavors hath been observed, but it doth not seem Policy to slap thee upon thy back at every show of

Common Sense, for if such were the case thou wouldst soon be afflicted of a Swelled Cranium.

At times my son it hath seemed unto me as if I were not in the proper field of Endeavor, but the Coming Up in any Business is like unto the sowing of seeds as spoken of in the Scriptures.

That which springeth forth quickly soon fadeth away for Lack of depth, but that which cometh forth in due Season, standeth the heat of the noontime Sun.

All this meaneth that whosoever worketh diligently, and striveth for knowledge and gaineth for himself a perfect understanding in the Ways of the Business, the same is capable of doing the tasks set before him in a manner which pleaseth his Employers.

But whosoever maketh a Grandstand Play and putteth forth much Bluff the same is not able to stand the Test.

So now my son, get thee hither unto thy place of employment, do thy work to the best of thy knowledge and understanding, and strive at all times to perfect the workmanship of thy hands and the thoughts of thy brain, for I say unto thee that in due season thy reward shall come unto thee as surely as Tyrus Cobb will steal unto himself Twenty-five bases this coming season.

Mr. W. Re Brown, Editor of the "Wrinkle Department," then said: Mr. President and Gentlemen: I know you are all hungry and the time for our noon recess has arrived, therefore, I will be brief. All together the live gas men of the country have contributed 145 Wrinkles this year and one called "4-11-44" whatever that means — for luck, I guess.

A certain wise man — I think his name was Holbrook — I do not know whether any of you know him or not — sent a card around suggesting that the employers of the various gas companies look at the names of the men who contributed to the wrinkle department and he suggested the advisability of promotion to such contributors, adding that if you do grant such recognition you will very rarely pick a lemon.

The Association through the medium of the editors of the

wrinkle department called for volunteers. There is nothing much for me to say except that the men who contributed to these 145 wrinkles are the heroes who answered the call and I think the thanks of the Association are due to the individual contributors of wrinkles for the way they have responded to the call of the department for volunteers.

I am just reminded that Mr. Diescher is Assistant Editor of the Wrinkle Department and I believe it is the custom for the Assistant to do the talking for the department. So I am going to ask him to say a few words. But before concluding I wish to express my personal appreciation of the word of Mr. Diescher himself, and also to each individual contributor and to the men who were instrumental in procuring this large number of excellent wrinkles. Their work this year has been splendid. I also wish to thank the Natural Gas and Gasoline journals for their splendid cooperation so generously extended to us in the performance of our work.

As I said last year these wrinkles should be sought from the men who are actually doing the work. They are the men who furnish the best contributions. Although some of these wrinkles may not be new to all of the members of the Association, yet there is a valuable suggestion in every wrinkle; there is an improvement proposed and there is advancement noted, and that is what we want all the time in the natural gas business (applause).

President Guffey: I will next call upon Mr. A. J. Diescher, Assistant Editor, Wrinkle Department, of Bartlesville, Oklahoma.

Mr. A. J. Diescher, Assistant Editor of the Wrinkle Department, then said: Mr. President and fellow members of the Natural Gas Association of America: The gathering of wrinkles for this department, it goes without saying, is quite a job. Mr. Stone told us a year or so ago the difficulties which he encountered in collecting these wrinkles and for that reason he wanted to have someone else take over the work. Mr. Brown was appointed as Chief Editor and I as Assistant Editor. We divided our work into the territory east of the Mississippi and

THE PRIZE WINNERS

the territory west of the Mississippi. It never occurred to me the amount of work there is in gathering these wrinkles until I personally undertook to do it. Quite a few hundreds of letters were sent out. Many of those letters were never answered at all. Quite a number have brought good results. It looked for quite a while as though we were not going to get many wrinkles. This resulted in a greater effort on our part in an endeavor to stir up cooperation and assistance. If the wrinkle department is to grow and to have a greater number of wrinkles each year and to have good wrinkles, it takes the work of all of us. One point I want to emphasize is the cooperation between the managers and officers of the different companies toward getting their men to contribute these wrinkles. You must remember that wrinkles are not only for the benefit of those who see them in printed form and who read them and refer to them but it is also of great benefit to the men who contribute them, and of benefit to the companies whose men are contributing them. Now, I am sure that whoever has this work for the coming year will greatly appreciate the assistance of each and all the members of this Association in bringing in new wrinkles and I want to thank all those who have worked to bring about this most excellent result and all of those who submitted wrinkles this year (applause).

REPORT OF THE COMMITTEE ON AWARDS FOR THE WRINKLE DEPARTMENT.

After the meeting had adjourned, the following report was received by the Secretary:

June 15, 1917.

Natural Gas Association of America:

Your committee on award of prizes for the best wrinkles submitted to the 1917 meeting found it difficult to decide for what wrinkles prizes should be given on account of the large number and variety of wrinkles submitted. The following report is made up according to the best judgment of the committee. The prizes being given on the ground of originality and general usefulness of the wrinkle.

1st Prize, $25.00.

R. B. Lloyd, Supt. Lines, Wichita Natural Gas Co., Bartlesville, Okla.

Wrinkle No. 46. A Non-inflammable gate box.

2nd Prize, $20.00.

J. H. Schalek, Mfrs. Heat & Light Co., Pittsburg, Pa.

Wrinkle No. 128. Apparatus to determine direction of flow.

3rd Prize, $15.00.

A. H. Fricker, The East Ohio Gas Co., Youngstown, Ohio.

Wrinkle No. 69. Flash Light batteries.

4th Prize, $10.00.

H. O. Ballard, Supt. Production, Wichtia Natural Gas Co., Bartlesville, Okla.

Wrinkle No. 36. Baffle tee drip with automatic blow off.

5th to 10th Prizes inclusive, $5.00 each to

O. M. Baldwin, The East Ohio Gas Co., Kent, Ohio.

Wrinkle No. 14, Notice Card.

O. C. Hartsough, East Ohio Gas Co., Canton, Ohio.

P. Kennedy, East Ohio Gas Co., Cleveland, Ohio.

Jointly for Wrinkle No. 25, Adjustable Meter Support.

A. E. Boyd, Supt., The Ohio Fuel Supply Co., Ashland, Ohio.

Wrinkle No. 132, Casing Cover.

W. E. Nestor, Engr., Mfrs. Light & Heat Co., Waynesburg, Pa.

Wrinkle No. 100, Magnetic Air Whistle Telephone Alarm, for Compressing station.

A. L. Schneider, Pittsburg & West Virginia Gas Co., Clarksburg, W. Va.

Wrinkle No. 123, Rule for measuring pipe when piled.

J. J. Buchanan, Foreman Meter Repair Dept., Mfrs. Light & Heat Co., Pittsburg, Pa.

Wrinkle No. 141, Adjustable Meter Prover Check.

F. W. Stone,
A. P. Davis,
W. J. Broder,

Committee of Awards for Wrinkle Department.

PRESIDENT GUFFEY: As Mr. Diescher has the floor, I am going to ask him at this time to read his report as Chairman of the Committee on Conservation.

MR. A. J. DIESCHER: The members of the Conservation Committee are located at various points throughout the country and it is very hard to get the Committee together. However, there is really nothing of any sufficient importance to justify a meeting during the past year. I have prepared in conjunction with the members of the Committee a report which I will now submit.

Mr. A. J. Diescher, Chairman of the Committee on Conservation, then submitted the following:

REPORT OF THE COMMITTEE ON CONSERVATION.

To the President and Members of the Natural Gas Association of America:

Your Conservation Committee held no meetings during the past year. Letters were sent out to all members about the first of April, calling for reports on the Conservation situation in the various production districts of our country. Up to the time of submitting this report, reply was received from Dr. White setting forth the situation in West Virginia, which is quoted as follows:

WEST VIRGINIA.

Our Public Service Commission has, in practically every case brought to its consideration during the latter part of 1916, and up to the present in 1917, permitted the gas companies to raise prices to something like a fair basis, as between producer and consumer, and several other applications for such raises are pending, and I have no doubt that some or all of them will be granted a moderate increase in price for this, the best fuel in the world.

During the period of education, which has covered three or four years, our public men are beginning to realize that one of the best means of conservation of this precious fuel is that the users of the same should pay a fair price. A great waste still continues, especially from casing head gas in the numerous oil

wells, which probably amounts to 15,000, extending from Pennsylvania on the north to Kentucky on the south, entirely across the state. In many regions where this casing head gas contains considerable gasoline, the waste in question is being greatly reduced, but in others, very little has been done, so that probably 150 to 200 million feet of casing gas is yet going into the air and accomplishing no useful service whatever. It is confidently hoped, however, that as these wells are one after the other harnessed into compressing stations for the recovery of gasoline that this large waste will be greatly decreased even during the present year, so that the outlook for a greater conservation of West Virginia's wonderful resources in this splendid product is brighter than for many years even in the absence of any protective legislation whatever."

MID CONTINENT FIELD.

In Oklahoma, two principal elements affecting conservation of special importance, since the last report, at the Pittsburgh Convention, are:

1. The progress being made in the mudding off of gas in oil operations.
2. The great development of the casing head gasoline plants, and recovery of casing head gasoline at high pressures.

MUDDING.

Referring to the mudding process, as the most extensive use of this method of sealing natural gas in the sands is practiced in the Mid Continent field, necessarily the reference thereto shall pertain more to the practice in that territory.

During the past year the efforts of the Corporation Commission of Oklahoma, under whose supervision the conservation of Natural Gas and Oil rests, have been greatly handicapped in their efforts toward conservation by a controversy which arose on the part of the State Mine Inspector, as to who legally had jurisdiction over this charge. At the session of the State Legislature which recently convened, a bill was passed, creating an oil and gas department, under the Jurisdiction of the Corpora-

tion Commission, thereby fully establishing the jurisdiction of the Commission, and greatly broadening the field and extent of the Conservation operations.

According to newspaper reports, a meeting is called for May 26th, when the new rules and regulations pertaining to oil and gas conservation, are to be announced.

It is now going on the third year since the Conservation Law was passed in the State of Oklahoma, and the mudding process adopted under the Commission regulations, during which time remarkable progress has been made in applying this method.

Not only has this method been adopted by the Commission for the State of Oklahoma, but it is in effective use in the State of Kansas, where probably the greatest demonstration of its success has been accomplished, due to the control of large areas by single companies, who have made a determined effort to conserve the gas. There is no question but that the life of the gas supply and the rock pressures in the Shamrock Pool of Oklahoma, or southern extension of the Cushing Pool, was greatly extended through the application of the Conservation regulations.

This pool was developed by the oil operators applying conservation methods without any serious handicap to their production of oil, and with a total elimination of blowing wells, which were so common in the Cushing field a few miles north.

This field has had the combined supervision of the Oklahoma Corporation Commission Inspectors, and of the Bureau of Mines Inspectors.

In the northern part of Oklahoma, the Blackwell pool, which so far has proven to be principally gas territory, has been drilled with many wells to 3300 to 3400 feet depth, with practically a total absence of any continuously blowing or open gas wells.

Owing to the limited appropriation for carrying on the Conservation work, and the great and scattered territories which the inspectors supervise, it was not possible to have resident inspectors for each field, resulting in a shameful neglect upon the part of many representative and nationally known oil operators permitting their wells to be mudded off with water instead of mud fluid, being a makeshift and temporary attempt to seal off the gas until their casing could be carried beyond the gas

sands and oil sands reached, such attempts drowning out with water, not only are very bad from a conservation standpoint, but are very costly to the operator in many instances.

The principle of sealing off the oil sand by the mud fluid method is to enseal a column of liquid between the outside of the casing and the surrounding earth formation, this column being of such specific gravity and weight as to more than counterbalance the rock pressure of the gas in the sand. As the rock pressure corresponds closely with the hydrostatic column from the sand to the surface of the ground, it follows that same fluid heavier than water must be used to give sufficient margin for safety of excess counterbalancing pressure, to prevent the gas from blowing out. This heavier fluid is obtained by using water containing about 25 per cent, by weight, of clay or mud, avoiding sand or grit. This should be of a specific gravity of about 1.33.

If water is used without mud, or with too little mud, the solution remains thin and can permeate the porous sands and earth formations with which it comes in contact while standing behind the casing, and it is only a question of a short time until sufficient of this water is absorbed by the earth to reduce the height of the column and thus reduce the hydrostatic pressure to a point below the rock pressure of the gas, permitting the gas to escape from the sand and blow the water out from behind the casing. This is a very common occurrence, one operator having had four such blowouts from the same well before he had sufficient common sense to use a little more mud.

There seems to be not so much of an antagonism as a lack of care on the part of the principal operators, which is causing this kind of sealing in of gas sands. It is to be hoped that with the broader scope given the Corporation Commission at this last session of the legislature, and the funds available for greater inspection, that such operators shall be punished for this careless condition.

It is not to be understood that all operators are permitting such practice, as such is not the case. A number of the larger operators are conducting their operations in good faith, and are securing good results.

Notwithstanding this condition, the amount of gas blown to

the atmosphere in the Blackwell field is comparatively small, the greater loss being due to the flooding of shallow gas sands with water, and to the intercommunication between sands, due to the failure to mud off the wells.

A few fines and a little more education on the part of some of the operators will almost eliminate this wasteful practice in the State of Oklahoma.

In the State of Kansas, where there is no good conservation law, but where the operators are mostly voluntarily mudding their wells, remarkable results have been obtained.

The principal oil and gas development in Kansas at this time, centers more about the Butler County fields, where there are some 600 or 700 oil wells drilled. In the Augusta field there are about 100 gas wells drilled to the 1500 foot depth, and over three hundred oil wells drilled or drilling, which have penetrated and pass through this sand, the oil occurring under the gas deposit, and occupying practically the same area, so that practically every oil well has passed through the gas sand. Notwithstanding this, there has been no abnormal decline in the rock pressure of the gas wells, and no gas was blown to the surface. There is no defective well in the field today, from which gas is escaping. This is as near a case of perfect conservation as could be desired in practice, and shows that the main element as to the feasibility of natural gas conservation in the deeper drilling for oil, is one of the attitude of the operator, whether he desires to effect conservation, or is indifferent thereto.

It is hoped that the increased value of natural gas, to the oil operator, through the recovery of casing head or absorption gasoline, will cause him to view natural gas in a different light, and that he shall find it to his profit, as well as honor, to conserve, and stop the waste of this product.

In the Augusta field, gas wells have been drilled, mudded off at 1500 feet, an oil sand mudded off at 2000 feet depth, and the producing well finished at 2500 feet depth, while within 50 feet of such wells, other wells have been drilled, mudding off the 1500 foot gas sand, and producing oil from the 2000 foot sand, while within the same radius, wells have been drilled to the 1500 foot gas sand, taking the gas therefrom, and the mudding

in no instance interfered with any of the other wells. This could not be done with water, or thin mud fluid, as it would penetrate the sand to greater distances than 50 feet, instances being known where it has penetrated over 100 feet radius from a well.

In the Eldorado field where there are over 450 oil wells drilled to 650 feet depth, there are at least 100 deep oil wells drilled through this shallow sand, mudding it off, and at least 50 gas wells drilled, many of them passing through the shallow oil, securing the gas from several hundred feet below the oil, and in no instance has any trouble or injury occurred to prevent operating any of the sands desired—oil or gas, mudding off all sands excepting the one from which the particular production desired is had.

Such demonstrations set an example as to the practice developed since the conservation laws were passed, and when operators were testifying under oath, that they had tried the mudding process and that it would not work.

The greatest part of the problem of the conservation of natural gas in the fields, has been solved and demonstrated on such an extensive scale that there is no excuse for its waste in any field in the country.

Further, the use of mud fluid for sealing off water, and other sands, and for supporting the earth formations from caving and "freezing" the casing; as so far demonstrated in practice, offers a great field of endeavor toward reducing the amount and sizes of casing necessary to drill deeper as in the present practice.

If this can be brought about, under the pressure of the great casing shortage which now occurs, and thus establish new practices of casing wells, getting away from the rut in which all operators work, due to frequent stepping down of casing sizes based upon the old practices, it will not only be a great blessing to the operators, and possibly bring deeper drilling within the scope of commercial operators, but such accomplishment would be far-reaching in giving the oil operators a greater incentive for being interested in the mudding process, and thereby

remove his indifference or antagonism to natural gas conservation.

CASING HEAD GAS.

The recovery of casing head gasoline from natural gas which occurs in contact with oil has been so extensively applied during the past year or two, as to bring about a problem in many sections of our country, of the use of the tail gas from such plants. It is reported that in the state of Oklahoma, the Corporation Commission will not permit the wasting of such tail gas. The amount of gas so recovered is now growing to such a great extent as to offer an excellent field for the natural gas pipe line companies to consider mains for collecting and conserving such gas for the market. Most extraction plants, especially compressor plants, compress the casing head gas to pressures as high as from 100 to 200 pounds, at once making it available for delivery to the natural gas pipe line systems. It is not necessary to greatly reduce the pressure of this gas as it leaves the gasoline plant. Often such gas is used for operating purposes on the leases, but in many instances there are large quantities of such gas available for market.

Up to the present time there has been no great movement toward gathering such gas, by pipe line companies, but if the conservation is to be effected in its full commercial sense, this is a field which justifies great attention from the natural gas operators.

The adoption of an absorption system for treating natural gas in large volumes and at high or low pressures, for gasoline recovery, again offers a field for oil operators to recover a special income from such gas.

Anything which can bring an added income to the oil operator must necessarily interest him, whether it comes as a direct payment for the gasoline recovered, or as an increased price per thousand cubic feet for gas, is not so important as that it brings him a greater income to interest him in conservation and protection of the source of that income.

The matter of interesting the oil producers in the conservation of natural gas, by making it profitable for him to do so,

is a phase of conservation which should not be overlooked by the natural gas operators and pipe line companies.

As a summary, the committee is pleased to report that conservation of natural gas movement is more firmly established at the present time than in the past, and that great progress is being made in natural gas conservation; that many of the retarding elements of older times are disappearing, and that with the added value of natural gas, both as a direct sales value, and as a gasoline recovery value, is centering great attention on this subject in the producing fields, and that it is the belief of this committee that much greater progress will be made in the early future, due to this concentrated attention and effort.

It is the desire of the committee to again record the appreciation of the natural gas industry, of the efforts of the Oklahoma Corporation Commission, and the Bureau of Mines, and of their continued and effective efforts toward conserving this valuable resource for our people.

Respectfully submitted,
Israel C. White,
Ernest L. Brundrett,
William T. Griswold,
Forrest M. Towl,
Alfred J. Diescher, *Chairman.*

President Guffey: The Association is certainly indebted to Mr. Diescher as Chairman of the Committee on Conservation for the very able and complete report which will be filed and ordered spread upon the minutes if there is no objection. I would suggest that a motion be made, extending to the Committee and particularly to its Chairman a vote of thanks for this most excellent report, and that the Committee be continued for the coming year.

Mr. John M. Garard: Mr. President, I move you that a vote of thanks be tendered to the Editors of the Wrinkle Department for the able manner in which they have conducted their business and I would also like to add that, on account of their very great activity and the manner in which they have brought about the present result, that this committee be con-

tinued for another year, if I am not exceeding my prerogative in making such a motion at this time.

MR. MARTIN B. DALY: I second the motion.

And thereupon the above motion, having been duly seconded, was unanimously adopted.

MR. JOHN M. GARARD: I now move that a vote of thanks be extended to the Committee on Conservation and especially to the Chairman thereof for the comprehensive and exhaustive report submitted by the Committee; that the report be received, filed and ordered spread upon the minutes of the Association and that the Committee on Conservation be rewarded for their excellent work by being continued for the coming year.

MR. W. RE BROWN: I take pleasure in seconding this motion.

The above motion, having been duly seconded, was then unanimously adopted.

PRESIDENT GUFFEY: Before taking our noon recess I want to make this announcement. We were greatly disappointed this morning to receive a telegram from Mr. A. C. Bedford, stating that he had been detained in Washington last night by work connected with the National Council for Defense, but we are pleased to announce that he will arrive about one o'clock this afternoon in Buffalo and will make an address at the afternoon session of this Association sometime between two and three o'clock. I hope we will all be here because he is going to talk to us on a subject that is of interest to all of us. We will now take a recess until two o'clock this afternoon.

And thereupon a recess was had until 2:00 P. M. of same day.

SECOND DAY — AFTERNOON SESSION.

WEDNESDAY, MAY 16, 1917.

PRESIDENT GUFFEY: The convention will please come to order. The first paper this afternoon is one entitled "Rates" prepared by Mr. Leslie B. Denning, President of The Lone Star Gas Company. I will now call upon Mr. Denning.

MR. LESLIE B. DENNING: Mr. President and members of The Natural Gas Association of America: The views that I have presented in this paper are not put forward as a positive solution of our troubles in regard to rates. They are more in the nature of suggestions; something to think about; something to talk about and in the general mix up of thought and talk and ideas, we may be able to reach a solution of the troubles that are bothering us.

Mr. Leslie B. Denning then read the following paper:

RATES.

By Leslie B. Denning.

I do not propose to discuss "rates" in either a legal or technical sense. Papers and reports heretofore read before this association have presented the legal and engineering phases necessary to establish proper rate of return in a given rate case before a commission or other rate regulating body. The views which I present will be directed merely towards achieving one end, that is, a higher average price per thousand cubic feet of gas output and increased net earnings in the profit and loss account at the end of the year. It does not always follow that an increase in rates means an increase in net earnings.

I have in the past held the view that I did not know of a single gas man who was selling natural gas. I may now qualify that statement by saying that I know of but few who are actually selling gas, in my judgment, or perhaps it would be more accurate to say, who are using good salesmanship in disposing of their product. Salesmanship implies the creation in the mind of

the purchaser of a desire to acquire your product at the price for which you are willing to part with it. Applying this definition it seems to me that I am not far wrong in the statement I have just made. It seems to me that in the majority of cases what we are doing is delivering to the customer the quantity of gas he wants, when he wants it, and at his price. Ordinarily, the price is that which the representatives of the buyers, the City Council or other legislative body has put upon it after we have made the best bargain we could.

We are called public service corporations, and are told that since our function is that of supplying a necessity of the public, to-wit: light, heat and power, and further because we use public property for the purpose of laying therein our pipes and mains, we must submit to regulation by the public not only as to the price we may charge for our product, but in the general conduct of our business. In theory this proposition may be sound although to my mind there is no more reason for calling a natural gas company a public service corporation than one who supplies bread, milk, or meat to the people. In practice, unfortunately too often the term public service is used synonymously with public slavery. Even the servant is entitled to a comfortable and convenient place to work, to fair wages and an occasional Saturday afternoon off, while the public service corporation must be constantly on the job without rest, and with no excuse for failure to perform, and quite often without proper compensation for the service rendered.

Another factor which must be considered, is the manifest disinclination of regulating bodies to grant increases in the rates of public service corporations, even upon good showing that such increases are absolutely necessary to meet advancing costs of labor and materials.

The problem of increasing the rates is manifestly, first, one of the capabilities and possibilities of the individual company under consideration. To determine these, the first step is a careful analysis of the company's business and prospects. A company with a large supply of gas would be in a vastly better position than one with a limited supply, given equal market

opportunities, so that after all the first question is how much gas have we got to sell. The next questions are to whom, for what purpose and for what price will we sell it.

All gas companies make a point of seeking what is ordinarily called domestic business, that is lighting, cooking, heating and household purposes, and this business is supplied at the highest price at a fixed rate in force in the community, with here and there a sliding scale based upon quantity consumed.

Ordinarily this price is about one third, sometimes less, of what the customer would have to pay for a commodity rendering equivalent service. To my mind this is an entirely wrong situation. I see no reason why the consumer of natural gas should not pay something near the value of the service considered in its relation to competing commodities rendering equivalent service.

We are met with the argument that the people should have the benefit of the resources of nature. I have even heard the argument that nature placed the gas in the ground, and that as man did not create it, therefore he who takes it from the ground and conveys it to market should only be paid the cost of the service he renders. I cannot see this argument possesses any merit. When the farmer plants wheat he afterwards reaps that which nature creates and ripens into a finished product, but so far I have not heard the argument advanced that the farmer should sell his wheat at cost plus six percent. I firmly believe we should strive to obtain that price for our product that it is really worth, and I believe such a policy will redound not only to the benefit of the companies in the business but to the direct benefit of the users of the product, because it will decrease the average consumption per meter, and will prolong the time the public may enjoy the benefits of natural gas.

That the natural gas producer must in the future secure a higher average price for his product is a proposition which cannot be disputed. The constantly increasing cost of labor and materials, the diminishing supply of the product itself, the necessity of going farther away from the market to maintain a supply of gas, makes it absolutely imperative that the average price

per thousand be increased if the producer is to keep in business and the public is to have the benefit of his efforts. It is not an easy matter to secure an advance in the price of the product where the public have been educated to expect and demand a low price, particularly where the buyer has and exercises the right to fix the price he will pay. In almost every line of private endeavor the seller of the product makes the price he will sell for it. In the public utility field the buyers say what price they will pay for it, consequently it becomes absolutely necessary to convince the buyer who is fixing the price, either that the product is worth more money or that he will have to pay the price or do without it.

How to accomplish this with the least friction and still retain the good will of the public is the problem. Several years experience with commission control has not made me enthusiastic over the results to be obtained from the commissions when seeking rate increases. The expense of preparation for the necessary hearings is usually very great, and the delays are usually such that it may well be that the net result will not be found to be very advantageous to the parties concerned. The engineer for one of the State Commissions recently made the statement that "It is an axiom that it is almost as expensive to win a rate case as to lose one." I have in mind one rate case wherein I believe the expense to the city, to the gas company, and the tax payers of the state has not been less than $25,000, and the company is not one of the large companies at that. This case has been pending for over two years and the decision has not yet been given out.

It is quite possible for a company to have a rate case forced upon it by one of the smaller communities, the resulting expense of which would more than exceed the total revenues derived from the town for several years. I do not say this in criticism of any commission or of any commission control, as I have always supported the idea of commission regulation: I merely desire to point out that in my judgment it is better to dispose of rate questions directly in the communities where they arise. I believe that we who have natural gas to sell have not given the

attention that we should have to proper selling methods and the education of the public generally, to the benefits the public receives from natural gas and the value thereof.

I estimate that at least ninety-five per cent of the gas sold for domestic purposes is sold to, used by, and paid for by women. The average man is perfectly content to turn over to the woman of the household full control and responsibility of the domestic establishment. Whether or not the women vote in any given community, they can and do wield an enormous influence in that community in regard to any economic question that affects their comfort and well-being. If any gas man doubts the statement that the great majority of his customers are women, let him take his stand any time at the cashier's window when gas bills are being paid, and I think he will very soon be convinced. The women know more about the comfort and convenience of gas in the house than men do. I have had women say to me, "Why, I would give up my telephone, my electric lights, and almost anything I have in the house before I would do without gas service." Time and again I have had customers say, "I would be willing to pay almost anything to keep natural gas."

A striking illustration of the interest women take in natural gas came under my observation some time since. A certain company had been forced into a rate controversy with the political authorities whose sole aim and object, admittedly, was to compel a reduction in price, regardless of the effect such reduction might have on the service. The company planned and carried into effect an advertising campaign using the daily papers for the purpose. The campaign was based upon the idea that the women would finally control the whole situation. The weather was warm and but little gas was being used. In order to get the women interested and bring the matter to their attention, the company published an advertisement offering a prize of five dollars in gold to each of the first five women who would send to the company's office a complete set of twelve consecutive months paid gas bills. It was estimated that not over fifty replies would be received, the real idea in the advertisement being to get the women to thinking and talking natural gas. The response

was amazing. Within two hours after the advertisement appeared, the first five complete sets of paid bills were in the company's office. Altogether five hundred replies were received.

Fifteen years experience and contact with the gas using public has taught me that the best asset a public utility company can have is the good will of its customers. In fact its value can hardly be estimated at too high a figure. Good will can only be secured and maintained by constant good service and fair dealing.

I have borne at some length on this phase because I want to call attention to the fact that the good will of the community and the belief of our customers in our honesty and fair dealing will very often be the deciding factor in enabling us to settle rate controversies right where they spring up, without the expense and delays incident to appeals to commissions or court proceedings.

The domestic load is usually about six times as great in cold weather as in the summer. This compels the company to maintain line and compressor capacity and gas supply for a peak load six times as great as the low domestic load. The result is that there is an excess of line and compressor capacity which ordinarily cannot be used in the summer; also an excess gas supply. If the domestic consumer could be educated to the point of paying a price sufficiently high to enable the company to maintain this excess as a reserve for future use the problem would be simplified somewhat. Unfortunately we have not reached this ideal condition. Every company is compelled to tackle the problem of how to dispose of this summer excess gas at the best price. My solution is, get on industrial consumers at a price as near the equivalent of competing fuels as can be obtained. In securing this business we will have to radically change our methods. The day is past when we can take a piece of pipe with little holes in it, call it a burner, and put it under a boiler and supply gas through it. Competitive conditions not only demand a change in the methods of installation and appliances used, but also in the character of the men who solicit and have charge of this class of business. Gone also is the day of the pipe fitters

and plumbers in the handling of high grade installations. The men we send after the business should be, so far as possible engineers trained in the laboratory, with at least a working knowledge of the laws of combustion; men who are able to go into an industrial plant and work out appliances and systems of applying natural gas in efficient ways to the problems of that particular industry. The companies who have recognized this condition and have acted accordingly are the ones who today are securing the highest prices for industrial gas. A manufacturer recently made the statement in my presence that he figured the cost of the gas from his oil producer plant was equal to sixty-cent natural gas. Manifestly if industrial plants can and do pay forty and fifty cents per thousand for artificial gas with a B. T. U. content of 550, why should they not at least pay that, or more, for natural gas with a B. T. U. content almost double that of artificial gas?

As I said above, the problem of how to dispose of the product at the highest price must be solved by each company, due consideration being given to individual conditions, such as amount of supply, character and extent of market, etc. No hard and fast rule can be laid down to apply to all cases. Generally speaking I would say, first, let us study the possibilities of our own business carefully and in the light of scientific developments, second, educate ourselves to think of our business as a business selling a service rather than a commodity, third, let us educate the public as to the *value* of natural gas service, fourth, let us go after the industrial business using the best methods that the ingenuity and trained brains of the gas industry can devise.

DISCUSSION.

After the hearty round of applause had subsided following the reading of Mr. Denning's paper, President Guffey said: I am sure every member of the Association joins with me in thanking Mr. Denning for the very able and instructive paper he has just read. The meeting is now open for a general discussion on the paper "Rates". To start the discussion I am going to ask Mr. J. H. Maxon, President and General Manager

of The Central Indiana Gas Company, Muncie, Indiana, to come forward and address us.

MR. JOHN H. MAXON: Mr. President and Gentlemen: Mr. Denning insists that rates and charges should be established that will produce, for the Natural Gas Industry, a higher average price per thousand feet of gas delivered, and greater net earnings; and no fair minded man who is familiar with the present status of the natural gas industry will refuse to support this proposition.

The true value of natural gas service may be said to be that amount which the user of the gas would have to pay for another service or commodity, which could produce for him the same results which the natural gas he uses does produce. This being true, then it may be said, that no persons, firms, or corporations in the United States are being more poorly or inadequately compensated for the article, service, or commodity furnished to the public than are the natural gas companies.

That an increase in rates (if we take this to mean an increase on the "straight rate" basis of the price per thousand feet) is not always followed by an increased net earning is certain.

What is needed is an adjustment of rates and charges that will place the present unprofitable customer in the profit producing class; and the careful analysis of the sales of any gas utility will show that the unprofitable customers' names occupy the major number of the lines on our ledgers.

In every gas distributing operation, there occurs a certain amount of operating expense that does not vary with the amount of gas being used. The cost of maintaining offices, clerical work, reading the meters and delivering the bills are among the items. A total of these charges, divided by the number of consumers will show the "consumer cost" which is outside of the cost or value of whatever gas is delivered; and outside, also, of return and depreciation to the property involved in the delivering of the gas.

Analysis of operating costs of different gas utilities shows that the "consumer cost" amounts to a very large sum, ranging anywhere from $6.00 to $12.00 per year per consumer. Probably no more fair or equitable method of adjusting rates and

charges for natural gas service could be found than to make a fixed monthly charge against every consumer, outside of, and in addition to the charge for the gas furnished; and, of course, the proper amount of such charge would vary in different operations.

This method of charge to cover "consumer cost" has met with strong opposition, but, I believe the plan should be earnestly advocated by the gas interests, as it can easily be shown to be entirely justifiable, and is perhaps preferable to the plan of obtaining the same results by increasing the price per thousand on the initial deliveries of gas, or, by the use of a "minimum" charge, as the "consumer charge" in itself provides a minimum charge. With proper explanation, regulatory bodies may be convinced of the merit of this plan, and I am confident that the public mind will approve, after full and complete explanation has been given through judicious publicity.

For the purpose of securing fair and equitable compensation, the present price per thousand cubic feet for natural gas need not be materially changed, provided, proper charges covering "consumer cost," readiness to serve expense, and demand charges covering the cost of providing for variable demand are added to the present schedules of rates. Considering the rate subject I think it would be very well if rates which might be termed prohibitive rates and used for the purpose of discouraging any class of service that brings break-down in our service or rates that will enable the companies to provide facilities to carry peak load business might be given sober and deliberate thought in an earnest effort to work out a proper solution of this complex situation.

I believe that the natural gas interests should unite on some plan whereby a complete survey of the territory where natural gas is now delivered should be made, in order to determine what prices are competitive with other service or commodity that could be used to do the work now accomplished by natural gas; and that a strong co-operative effort should be made to convince the public that in its interest, and the interest of true conservation of a great natural resource, much higher charges for natural gas service are desirable.

As Mr. Denning points out, natural gas has always been marketed without attaching a value to the gas at its source. This also has been largely true of the marketing of coal, but recently our brethren in the coal business have begun to attach great values to coal at its source, and are making up for lost opportunities by leaps and bounds.

In concluding my remarks on "Rates" let me say, that the natural gas man, whenever he thinks on this subject, should have the following incontrovertible fact fixed firmly in his mind: "No man knows how to manufacture a commercially practical gas that is, foot for foot, much more than one half as valuable as natural gas (applause).

PRESIDENT GUFFEY: We would like to hear from Mr. R. H. Bartlett of the Oklahoma Natural Gas Company.

MR. R. H. BARTLETT: Mr. President and gentlemen of this Convention: When the suggestion was made that I make a few remarks by way of discussion on this paper, I had two thoughts in my mind, one was why they asked me, and the other was what I would say.

Now Mr. Denning's paper has brought up for discussion a subject that is of great interest to us all. Gas men generally have been waiting in the gas rate trenches for a good many years hoping for some decisive and concerted action with reference to natural gas rates. Volumes have been written and many hours spent in discussing this all important subject. It is very pleasing to we Western gas men to see these big splendid gas organizations here in the East making some progress in the solution of this perplexing problem. I believe more progress has been made in the last two years on this subject than in the whole twenty years preceding. To my mind the reason for this is the businesslike way in which you are going at it. It is simply the application of science to a business problem. There is no question in my mind but what this subject is the paramount issue of the entire natural gas business today.

Mr. Denning's paper is brief,—possibly because he was in the habit of writing "briefs". He has made many good points and his paper is interesting, but I have not had sufficient time to consider it carefully for discussion. When we begin to talk about rates

at a Convention we are not only talking to the gas men, but we are talking to our consumers as well, and we are talking to our stockholders and to the utilities commissioners of all the states where natural gas is sold. It goes into the record and is spread broadcast. Now some of us who may be fortunate enough to be making a little money at our present rates don't want to say much about rates. Others who are not breaking even are anxious to have the subject brought up all the time and want to be discussing it with everybody to find out what they can do to remedy their condition. We all agree that we ought to have higher rates. Higher rates does what? It conserves gas. We must conserve the gas if we are going to stay in the business. Higher rates bring our stockholders a little better return. Probably all the interest that our stockholders have in the natural gas business is the dividend check they get every three months. Their ideas do not go much beyond that. In fact, I do not know whether there are very many large stockholders belonging to this association or not. They ought to belong. They are the owners of these properties. They ought to be here helping out in the discussion and in the solution of these vital questions.

The conservation theory is the most vital to the gas man. Without that we will all come to grief sooner or later. This subject is a mighty broad subject. You can write volumes on it. You can talk all around and come right back where you started from and you find that you have not said much.

One difficulty that comes to my mind is the fact that there are so many varied rates all over the country. The people do not understand that. One company may make money at twenty-five cents a thousand and another company may lose money at thirty-five cents a thousand. These commissioners get all this information that comes through this convention; they get all the circular letters that the gas people send out; they get all the printed statements year after year; they compare them and I do not blame them for some of the opinions they form. It is a big propisition; it is a complex proposition. You can talk for a week and you have only just begun to say something about rates. Now we all concede that they are too low. We all agree on that.

How did they happen to get so low? What did we do? Whose fault is it? It is not the people's fault that they are low. They were a little better traders than we were. That is all. I call to mind a little thing that occurred years ago. Of course we all know when we started in this gas business it was a flat rate system. We started to sell something without measuring it. We let them have all they wanted as long as they gave us a dollar per stove. That is why we are on the defensive for higher rates today. We did not have any way to satisfactorily measure it in those days. We let them have all they wanted; burn it as they wished after opening doors and windows and we did not care what they did with it; they paid us a dollar a stove in the summer time and two dollars in the winter time. That illustrates the ridiculousness of the proposition at the start. Eighteen dollars per year for gas to cook and heat with, for a whole family.

What I was going to say was to refer to a little personal experience when I first started in the business some nineteen or twenty years ago. It was in a little town. Of course you will all recall who were engaged in the gas business in those early days that when it started in its infancy it started in the smaller towns first. We did not get into these big cities until we got more gas. People then didn't know what they had. The whole proposition was crude and they didn't know what to charge and so they started in on this flat rate system. A little incident comes to my mind in the little town where I worked in the gas business. Wood was very cheap. Farmers brought it into the little village. It didn't cost much and merchants would trade groceries or trade a bottle of medicine or dry goods for a load of wood. When gas came in and they started to pay a real dollar per month or two dollars per month and they stopped to consider whether it was not more expensive than the wood for fuel. Their bills ran up to eighteen or twenty dollars a year. Just think of it! They commenced to trade and dicker with the early gas men right from the start. Women began to trade. They came to the gas office and said, "I cannot afford to pay a dollar for this gas for a whole month. I can't afford to pay the increased price. It has been costing us fifty cents for our fuel.

Of course I like the gas and I am willing to pay a little more for it, but my husband is a druggist." That was the case in the particular instance I am bringing to my mind. "And he makes liniment and furniture polish at two or three cents a bottle and when the farmer comes in he trades this for wood and our fuel bill don't cost us only a few dollars a year." Once in a while they slipped in a bottle of Peruna. In those days gas men were easy and they were anxious for business and they had more gas than they knew what to do with and they let that lady get by at fifty cents a month just to keep her still. She talked about it. Then similar arrangements had to be made with other customers. Then when the gas in the local field began to go down a little — we naturally turned our attention to higher rates. I don't know the history of this meter business, but the meter came in vogue and we started to sell by the meters and when we began to figure at the rate per thousand feet based against the flat rate system, we had to make the rate per thousand pretty low to keep the public off the back of our neck. That is my idea of how we got started on this low price basis. That is just a little reminiscence. It does not do any good now so far as this subject is concerned except to call our minds back to the way in which this matter got started wrong. However, I am taking up a lot of time without getting anywhere and that is about what I expected to do when I came up here. We got these meter rates in so low that in a very short time we were required to figure on a method for getting them up higher and we have been figuring along that line now for twenty years and we will keep on figuring until the public realizes the benefit and importance of higher gas rates, to the end that the natural gas may be conserved and the gas properties realize an adequate return on the investment.

We boosted the rates a couple of cents in Bradford years ago. I remember the first experience I ever had in raising rates. We raised the rates I think from twenty-two to twenty-four cents or something like that. It was a two-cent raise as I remember. We did not have the mayor and the council after us then. Politicians were not jumping on corporations at that time for political effect. After the rate was boosted two cents for

three or four months we would stand at the counter and argue with customers why they ought to pay a little more money for this same product they had been getting cheaper. After while we talked them out of it and discouraged them in continuing their opposition and the rest went along all right. That was the way the gas companies did when they first began to raise meter rates. The people then did not think of asking for an injunction or anything of that kind. It was not long, however, until they got into that field. Then we had the trouble with the local municipal organizations. Every time we attempted to raise the rate a cent or two cents a thousand we were called upon the carpet and then we had this same subject to hash over back and forth. Their minds were not open. We knew that on account of the uncertainty of the business we ought to have more money. Depreciation of property is more or less of an estimate and of course we know nothing about how long gas is going to last. There is absolutely no fixed rule for rates. There is no fixed rule in the matter of gas and gas supplies. There is no fixed rule as to the deterioration of pipe. In fact, the whole game is blind from start to finish. We will never know where we are coming out until we do get out. That is my idea of the gas business.

Later one state after another created the public utility commissions which has occurred within the past few years. I do not know and I have not figured out in my own mind whether we are any better off with commissions now than we were when dealing with the individual or local municipal authorities. It is a question. As a lot of commissioners read these remarks, I will "soft pedal" a little bit. There are a lot of good fellows on these commissions and they have taken hold of this subject and they have gone into it very deeply. That is particularly true of Oklahoma. The difficulty with the commission proposition is just the same as it is with local organizations. About the time a man begins to learn a little bit about the gas business and becomes familiar with the gas properties in his district, he is out of office and another man comes in and he has to go over the same ground again.

Then another feature is the fact that the people generally and particularly our customers, in the past at least, have been a little more or less suspicious of public service corporations and, indeed, of all corporations in general. I will not attempt to say anything about why that is; but it has been so in the past. However, I am glad to say that it is getting better. The people are looking into these matters as they come up more and more and it makes no difference whether it is the gas business or what it is. They do not want to be talking on a subject unless they know something about it. They are not as crazy as I am (laughter and applause).

There are one or two other matters that I had in mind, but I do not want to take up so much time. In fact, I am very anxious to get away from here myself. This rate proposition and conservation proposition is a great problem in the gas business. I have had gas men say to me, "Bartlett, what are your rates out in Oklahoma?" Well, the average domestic rate is twenty-five cents and we sell boiler service down to ten cents. Those are the regular rates, although there are some lower than that. They say to me, "You fellows must be crazy. What is the matter with you?" Well, now probably we are. No question about it I guess. A gas company may make a good earning at twenty-five cents, as I said before, whereas another gas company will lose at a higher price, so that there is no way we can make a fixed rate for the commodity because the whole situation is different. There are so many different angles; so many varying conditions; so much hazard as to supply; so great uncertainty as to demand, that it is a problem about which there can be no fixed standard. You have to charge in each locality with reference to existing conditions in that locality. You have to figure it out separately. We are fast coming to a condition where we must raise all our rates in Oklahoma. But it seems to me we ought to work out some fundamental rule to go by so that we may be able to work together. There ought to be a committee — a standing committee of this organization to whom we could go when we get into rate trouble — and we would be there all the time, of course — to get advice and try to work out

a solution of this problem along similar lines and by similar methods. If we had a concentration of all our energies may be we could get somewhere.

Now in Oklahoma we have the trouble that Mr. Diescher spoke about this morning, the waste of gas. The same thing obtained in these fields in the East years ago, but never as bad as it was in Oklahoma. The conditions out there were different. There were so many sands; so many operators. Ten or twelve thousand operators, whereas a hand full back here. The majority of them did not know anything about the gas business when they started drilling. They drilled right through gas sands and let the gas blow. We had a situation of trying to sell something to the people that the producers in the field were blowing away. We had to stop the waste first before we could talk about rates and prices. I am glad to be able to say we have cut that waste down. We have had the co-operation of the state authorities and finally the Federal Government came in and assisted us in the work of conservation. A great percentage of the waste has been stopped. We will be in the gas business a great deal longer out there on that account. I guess, Mr. President, I will not take any more of your time this afternoon. (Applause.)

President Guffey: We would like to hear from Mr. H. J. Hoover, Commercial Manager Gas Department, The Union Gas & Electric Company, Cincinnati, Ohio, on this all-important question.

Mr. H. J. Hoover: Mr. President, and gentlemen: Mr. Maxon covered several points in his discussion on the rate subject which I had in mind, but which are unnecessary to repeat because they were very well presented by him.

There is one thought that has occurred to my mind which might be well to consider at this time. Last winter we were probably all confronted with the solution of the complexing problem of an abnormal demand for gas, due to an abnormal condition. That abnormal condition may for the future become a normal condition of demand. I do not believe there has ever been any well defined decision by a public utilities commission or a rate making body as to how far the responsibility of the

distributing company extends as to the question of adequate service for its patrons. Going back to the artificial days, the prime uses of gas were for lighting and cooking and some minor uses such as water heating and perhaps incidental heating. Natural gas has been so cheap and has been so good that people are demanding it for the displacement of other fuels and they have made a demand for it beyond the capacities largely of the distribution companies' plants and these companies are brought up to the point of making additional capital investment to supply more gas. It seems to me that the question might well be considered of putting up to rate making bodies the determination of the function of a distributing company and how far its responsibility may go. If a company which is now given the privilege of selling gas under certain conditions, when it has it to sell, at less than its franchise rates, it seems by the same method of reasoning that it might be privileged to sell gas above its franchise rates under certain abnormal conditions. In other words, if the average consumption for what are considered primary uses of gas could be fixed we will say at eight thousand or ten thousand cubic feet, or whatever the rate making bodies upon proper investigation would find it would cover, then to give to the gas companies the privilege during the peak months to sell gas if they have it to sell or if they are justified in making the capital investment to supply it, at a substantially higher rate than the franchise rate in supplying the average consumer. That might be somewhat radical, but if it can be established it would be a move in the right direction. It was somewhat recognized in Ohio last year by the commission during the gas shortage, that it had the right under its powers and for the purpose of taking care of a large majority of the public to discontinue the use of gas in large quantities to certain consumers. In our city they cut it down to the point of even asking the users of gas of one hundred thousand feet per month to get off the lines. If the Commission has the power, or assumes that power,—I doubt if it has ever been presented to the courts for settlement, but if it has that discretionary power, it seems to me it is reasonable to suppose it may fix a point in our business by which you are required to give adequate service three hundred and sixty-five

days in the year, but it will not mean that you will have to make additional investment to take care of the peak load of perhaps a few days or a few weeks. But if you are in a position to do it and can get contracts to justify you in doing it, it seems to me it should be the privilege of the gas company to do it. Now that is just a thought, but it has this advantage, that it would be popular with the people. If you can reasonably assure nine of your customers that they will have adequate service three hundred and sixty-five days in the year, if you can fix a price, even though it is higher than the franchise price to the tenth consumer that will prevent the interfering with the service of the nine consumers it will certainly be popular with the people and after all, rate making bodies will have to have the support of the gas buying public just the same as they will have to have the support of the people selling gas. I have discussed this with a few gas men and it has met their approbation. I believe it may be worked out. I am giving it to you for what it is worth. It is somewhat radical. Mr. Maxon has covered the other points and that is all I wish to say. (Applause).

President Guffey: We would like to hear from Mr. Stone of The Ashtabula Gas Company if he is present.

Mr. Frederick W. Stone: Mr. President and gentlemen; the paper has been pretty well covered by the gentlemen who have preceded me and they have taken about all the "thunder" that I have, but there are one or two features that have not been touched upon—

Voices: Louder please so we can hear you.

Mr. Frederick W. Stone: Did somebody say louder?

Voices: Yes; yes.

Mr. Frederick W. Stone: All right. I was saying that one or two thoughts have occurred to me which have not been mentioned. One was that the public, of course, fixes the price. That is not a new thought, but in connection with it we have been so anxious to have the price fixed in a number of cases that we have agreed to fix the price for a longer term of years than seems advisable under present conditions. The ordinary term of years for a price fixing ordinance in Ohio is ten years, but it seems under existing conditions it would be just as well if

the gas companies could work out a scheme by which they would agree to a price fixing ordinance for a period of five years. In five years you will probably need a much higher price than you are getting now and you will probably get it.

Another thought that occurred to me, I might go even further than that and say I really believe as far as natural gas companies are concerned that they are just as well off if they did not have any contract at all with a municipality. If they have no franchise; if they are able to say "If you want the gas, all right; but if you don't want the gas at a good price and for such a price as the company regards as an adequate price, then we will just suspend business with you and get out. We would like to do business with you, but do not want to do it at too low a price." That is a pretty radical view to take of the situation; but I really believe it might be a solution of some of the difficulties we are laboring under at the present time. Mr. Denning has said that he thought one solution of the price problem was to sell gas for industrial purposes. I agree with him that that is one of the solutions but when you come to selling gas for a low price, for we will say boiler purposes, it always seemed to me it was almost like feeding hot house lettuce to a cow. That is about the size of it. You are wasting mighty good material in a very poor way and the better way would be to work out some sort of scheme whereby that gas could be conserved for the purpose for which it is best adapted. The purpose for which it is best adapted and the purpose for which the people want it is undoubtedly for domestic consumption.

Mr. Hoover brought out a point along the same line that I want to refer to briefly. The point has been pretty well established that distributing companies are entitled to a readiness to serve charge because they have the meter and they have the men and they have the clerical force and all that sort of thing which they keep in readiness to serve the consumer regardless of the quantity of gas he uses. I will go a step further than that; while I am a distribution man and have nothing to do with the production end of the business, yet, on the other hand, I am rather inclined to think that the producing company is entitled to a certain extent to a readiness to serve charge. If they

are expected to handle the peak load and to maintain a ten inch line when an eight inch line would be just as well under normal conditions, they are entitled to a readiness to serve charge to the consumer of the gas. It seems to me if we could inaugurate some plan of that kind along that line, we would not need to sell gas for industrial purposes at such ruinously low prices. We will be able to get enough revenue from our domestic consumption so as to be able to serve them all the time.

The public fixes the price and in order to get a higher price from the public, you have to educate them to the higher price. You have to tell them something about what gas is worth in relation to other fuels. Someone said here this morning that they were very much surprised at the low prices at which natural gas men were willing to sell their product. There is no reason at all why we should sell natural gas for thirty or thirty-five or forty cents a thousand where artificial gas companies are getting from a dollar to a dollar and a half a thousand for exactly the same thing. The trouble is we have not had the nerve to ask what our commodity is worth. We have not advertised it enough. We have not told the people its advantages. There are two ways of educating the people. One is to educate them to the advantages and economies to be derived from its use and the other way is to educate them in regard to the cost and the hazards incident to the natural gas business. We have not done either one. A woman will go to the grocery store for oat meal or sugar or something of that kind and she will usually pay a much higher price for a package of the article than for the same goods in bulk and she will usually do it simply because she believes the package goods are not more economical, but more convenient to handle and possibly a little cleaner and maybe she thinks she will get a little better article, or she will telephone the grocer and have him deliver the goods to her home and pay a good stiff price, whereas if she would take her market basket and go down to market, she could buy the same article much cheaper. but she takes into consideration only the matter of convenience and will not go down to market where she could buy the article to the best advantage, but telephones to the grocery and gets the goods in that way because it is more convenient to her and she

wants to save time and trouble. She has been educated that way. We have not educated the women that way in the use of the natural gas and half of them do not realize because they have not been told how convenient it is; how clean it is; how good natural gas is as a domestic fuel.

Another feature of the business I desire to mention at this time. When you go before councilmen or before a commission or anything like that, when it comes to talking about the price of natural gas you have to talk figures and you have to have the figures before you in order to do it accurately. You know just as well as I do that two-thirds of the natural gas men do not know how much their business costs them. They do not know how much it costs to produce the natural gas. They do not know how much it costs to transport it. They do not know how much it costs to distribute it. They never make any analysis of their accounts. They have never taken into consideration all the factors which enter into the costs which go to make up the price of natural gas net to the distributor. They never take into consideration the intangible factor which goes to add to the cost of the article to the distributor. They do not take into consideration the overheads or the things that do not appear on the surface. As for example the matter of depreciation, original investment and various expenses constituting important intangible factors in figuring costs. They are the things that really cost and which we ought to work out in a systematic way so that when we are called upon to appear before rate making bodies we will have the accurate figures at hand showing total costs. I do not know why it is, but there is no business where we put the "soft pedal" on figures as we do in the natural gas business. For example take the matter of leakage. Ask the ordinary gas man if he suffers from leakage. He says yes, he had a little leakage, of course, but not very much. Well, what is it? He does not exactly know and he will hedge and fuss around. Go to the manager who operates many of our plants and ask him. He does not know very much about it. So that if you go to the manager for these facts you are not able to get very much out of him. I am just using that argument by way of illustration. We do not know what our leakage is. You can

state what the average figure for it is and consequently when you go to talk to rate making bodies about the cost of gas and you say to them that gas costs thirty cents with a ten percent leakage, making the actual cost at the meter thirty-three cents, you have no figures to back up your statement. It seems to me we ought to analyze our costs and really know just how we are doing business. I had another point in that connection, but it has slipped my mind just now. However, I guess I have said enough anyway. I thank you very much. (Applause).

PRESIDENT GUFFEY: We would like to hear from Mr. Miles B. Layton, Assistant Manager Manufacturers Light and Heat Company of Pittsburgh, on this important subject.

MR. MILES B. LAYTON: Mr. President and gentlemen: on Saturday morning I found on my desk one of those persuasive letters from our friend, Mr. Holbrook, saying that enclosed was a printed copy of the paper written by our friend, Mr. Denning, and asking me to discuss it today. Not being able to get in touch with Mr. Denning, on my arrival here this morning I found that he was ill. Otherwise I might have had him change the title of this very interesting article which he has prepared for us and have had it read something like this and I feel confident if I had talked with him he would have heartily agreed with me: "Suggestions For Natural Gas Salesmen Which Will Bring About a Fair Rate and a Satisfied Consumer."

MR. LESLIE B. DENNING: I heartily endorse that. That is the substance of the whole article.

MR. MILES B. LAYTON: I have had a varied experience in the sale of natural gas covering quite a number of years. It is an easy matter for a fellow to stand up here and tell you what you ought to do, but it is an entirely different proposition to do it yourself and get results. But at the same time, there is this one feature that has been wrong and has been staring us in the face all the years in which we have been selling natural gas. Rates are only estimates of actual values. We started in wrong. We had no conception of the value of natural gas when we started out. It had been blowing in the air free for years and people passed it by as of no value. We discovered one day we could use it and it would furnish heat by its use. We then

applied it. We started to use it. We had been using wood and coal. Wood in the early days was plentiful and coal was much cheaper than it is now. You all remember when we cut our wood with the little buck saw and didn't think much about the cost of our fuel, for in those days it was a very inconsiderable item of expense. We said, "Well, we will just substitute gas." Our wages were not very high and the value of replacing it with a fuel which cost no labor was very small and the result was that we started in on the wrong basis, never taking into consideration for one moment the actual value of natural gas for heating purposes and manufacturing purposes. Now we have suffered the sins of our forefathers all these years. We have had to come back in a begging attitude all the time. We have failed to say to the consumer that it is costing us more money to get it; the fields are becoming depleted. We all know this to be the fact. The fellow who is successful in getting an increased rate for gas from the consumer is the one who is in personal touch with the manufacturer or with the domestic consumer, even though it would be a lady. They are not the only ones who are willing to pay a fair price for natural gas. The moment that you can talk to them and tell them of the actual necessities; the conditions under which we are working; the failing supply; the increased demand; the extension of pipe lines running over long distances and everything of that kind that comes in contact with it, that moment you have those consumers agreeing to pay that increased price. Now your inability to show him and show him conclusively that you are honest in what you are saying to him, that moment you will fail to get him willingly to concede you are entitled to a higher price; but if you are able to tell him that there is this necessity; that you should receive more money for your produce, from that moment that you can convince him that is true, then he is willing to pay a higher price for the conveniences and advantages he derives from the article you have for sale. That has been my experience for years. We only fail when we are endeavoring to get an increased price for natural gas; when we suddenly spring upon an unsuspecting public, without giving them any idea of what is coming, like a stroke of lightning out of a clear sky, the unheralded announcement that "to-

morrow morning," or "commencing with the first day of July, the rate for natural gas will be raised to thirty cents a thousand." He immediately becomes "peeved." That is good English because it is a word we should use every day. He immediately becomes peeved at the thought that you would say to him arbitrarily that that was the price he will have to pay. Had we taken him into our confidence and said to him, "Now, we are thinking of raising our price on natural gas the first of July for the reason of the increased cost and the diminished supply," and telling him frankly and freely all the other factors that enter into it, he immediately feels that that is something that he is going to be required to acquiesce in from the standpoint of even justice and he commences to think. He analyzes the situation with the result that when he finishes analyzing the situation, he is willing to pay the price. Without trespassing too much on your time, I will give you a few of my own experiences. I hope they may be of help to you. I am not brushing off my own medals when I am telling you of these instances, but I am just telling you the plain facts because these are features of the business that each of you must face and must come in contact with and probably many of you have come in contact with more frequently than I. I have been brushing up on the rate question a good deal of late and endeavoring to boost prices for the most wonderful product that Nature or the Almighty has ever given to the human family, and that is natural gas. In my researches I have found this to be true and I refer to a celebrated case which went on for a number of years. There was a complaint from a consumer who had been called upon and who was notified to pay an increase in rate. It ran along for some time — and here is just a little history which shows how important it is to come in personal contact and get in personal touch with our consumers. A man who had utterly refused to do anything and all the influences which it was possible to bring about had been employed to get him to withdraw his complaint, was called upon and after discussing it for some time he says, "What do you want me to do; you tell me there will be a shortage and that I must prepare for something else. I know that it is costing more money than it ever cost and I am

not only willing to pay the price you have asked for it, but I am willing to pay an increased price, if necessary." Now why was that? Because he was led to realize the importance of an increased price if he expected to get the supply and he had implicit confidence in the statements that were made to him as to the necessity for the increase in price. Now I urge on all of you that we must take the general public into our confidence if we would have a satisfied consumer. First give him service. If you are not able to give him service which he is willing to pay for then explain to him the exact facts. Be honest with him. Do not hesitate and keep from him the facts; but say to him there will be a shortage and that you better prepare to take care of yourself when these peak loads come on an extremely cold day. What will he do? He says he will be willing to pay for the service at the increased price because he feels that you are doing everything that you possibly can to get the gas for him. We started in wrong at the beginning. It is a good deal like the fellow who had his head hurt. He applied to the doctor to have his head bandaged. He says, "What is the matter with you?" "I had my head hurt." He put on the X-rays and looked it all over and he says, "There is only one thing for you to do." "What is it?" "Take your brain out and scrape it." Well, he says, "What do you mean?" "Why," he says, "That is all I can do for you; it will take at least a couple of days." He says, "All right, it is doing me no good where it is now; go ahead." The doctor replied, "Come back in a couple of days and I will have it ready for you." The fellow was gone for several weeks and he came back to the doctor's office and the doctor said, "Where have you been all this time?" "Oh, I have been having a good time." The doctor says, "What have you been doing?" "Oh, I just went out and got in the natural gas business" (laughter and applause).

I don't want to give you any fatherly advice, but I want to say to you, as members of this Association, take your gray matter with you when you discuss supply and demand of the commodity you have for sale. Be fortified with facts and figures so that you can make the public, the public utilities commissioners, the manufacturer and the people of the community

know what the facts are. Give them all the information you have as to the actual condition of the commodity which you are selling; that it is a hundred percent pure; that it is the real thing and the only real thing for accomplishing the purposes for which it is used and that you are giving them their full share and that it is costing you from time to time more money than you are receiving for it. Tell them that if they want to continue in the service, they must pay you more money for it. It is not a question merely of advertising, but take a clean sheet of paper and figure out for them that you need so much money for development; yon need so much money for running expenses and extensions to pipe lines and that for all of these necessary expenses, in order to get the supply to meet the demand, you must have five cents more on the thousand cubic feet for your gas. Then after the public has been informed as to your necessities in order to supply the demand and make a reasonable profit, publish it the next morning in the newspapers that the price after July first will be five cents more. Do not be content with merely announcing that after a certain time the price will be raised five cents, but go further than that and be ready to tell them intelligently, honestly and frankly the reasons for the increase of price. I thank you very much (applause).

PRESIDENT GUFFEY: We have heard from most every part of the United States on the question of rates except northwestern Ohio. I am sure we all want to hear from our friend, Mr. James W. McMahon, General Manager, The Northwestern Ohio Natural Gas Company, Toledo, Ohio. Mr. McMahon, will you come forward and say a few words on this subject?

MR. JAMES W. MCMAHON: Mr. President, it is an unexpected pleasure you have extended to me in giving me the opportunity to say something about rates and to comment on Mr. Denning's very excellent paper. There is just one item in his paper to which I would for a moment draw your attention and that is that portion thereof wherein he says there can be no hard and fast rule laid down for rates. That is true. Most of you are tied up by contract. Most of the companies are tied up by contract for several years. You cannot break the contract. You

have to supply the gas if you can get it. Now that is an unfortunate condition to be placed in.

The natural gas business as far as rates are concerned is in a chaotic condition. Take it for example in the city of Toledo. We have 4,600 families that pay us thirty-five cents per month for a year of twelve months. The overhead charge on our meters, including labor and other incidentals, is over sixty-five cents. In other words, we are giving them a thousand feet of gas for domestic use and are presenting them thirty cents per month for the privilege of having them connected with our company (laughter and applause). We have 6,200 customers that pay us seventy cents per month; sixty-five cents for overhead and labor and we give them two thousand feet of gas at an average cost of two and a half cents per thousand that we are paying eighteen or twenty cents for down at the Ohio River. Now I don't know how you are going to get away from it. You say you will fix rates. You get up here and talk about fixing rates, but you must remember that the commission usually fixes the rates for us. We may say what we will about fixing rates; but the commission will fix the rate for us. It seems to me that is the place where we must do our educating. The people buy gas as cheap as they can. If you go to work and raise the price of gas generally, you have not stopped discrimination. The man that is getting his gas for thirty-five cents per thousand now and only using one thousand cubic feet per month for twelve months is riding free with the customers who are paying cost plus profit, and if you raise five cents per thousand, the discrimination still exists. I think about the only way to arrive at a solution of this rate problem is to have a readiness-to-serve charge of some kind or a sliding scale fixing the maximum price for the first one thousand feet or any part thereof and then a sliding scale on down so that each consumer will pay his proper proportion for the gas used. I do not see how you are going to get away from the discrimination if you do not do something like that and I do not believe any of you are going to get a great ways with rates at the present time. As far as I can find out, most of you are tied up for the next four or five years and I think at the expiration

of the term of the contract that you have with your various towns, natural gas will be so scarce that you will have to have an adequate rate if you sell it (applause).

PRESIDENT GUFFEY: Is there any other member of the Association present who would like to be heard on this subject? We would be very glad to hear from you if you have anything to add by way of discussion or common on the all-important topic of rates. If not, we will proceed with the regular program.

MR. LESLIE B. DENNING: I would just like to say a few words in closing this discussion.

PRESIDENT GUFFEY: I am sure we would all be very glad to hear from Mr. Denning. I should have called upon him to close the discussion on his paper.

MR. LESLIE B. DENNING: Mr. President and gentlemen: I have tried to point out in what I have said my belief in the ability and willingness of the public themselves to control the rate situation in the end. To illustrate what I mean I want to tell you a couple of instances that came under my observation and actual experience in the last year or two. In a certain city which will be nameless at the present time, the mayor was elected upon a campaign of reduction in the price of service of all utilities, including every class of utility in the city. He became very active. He selected to assist him in his work a certain so-called expert who had what might be called a national reputation. The expert, however, happened to be called to another natural gas rate case that I had personal connection with and in that case he testified under oath that he had no knowledge,— that he had no experience whatsoever in the organization, management, development or conduct of a natural gas property; that all the knowledge he had ever had, had been gained from reading books and talking with men in the business. In the particular city in which he began operating, the local newspapers —or at least one of them—gave him a very flattering send-off, spoke of his high standing and character and gave him a great deal of publicity, publishing a long list of cases with which he had been connected and showing how successful he was in his particular line. It was apparent from the outset that nothing could be gained by appealing to the fair-mindedness of the

mayor or expecting any fair treatment from him because he had entered upon his campaign with the declared purpose of being re-elected upon the platform of a decrease in the price of service by public utilities and he was bent on carrying out his campaign promises. The mayor had announced on a certain day the town council would meet and would pass an ordinance decreasing the price. The mayor happened to leave town, and coming back on the morning of the day upon which he had fixed the time for the passage of the ordinance decreasing the price of gas he found appearing in every newspaper in the town, the Italian paper, the German paper, the Trades Union paper and every paper in the city in which space could be obtained, a page advertisement addressed to his expert in which a series of questions were put to him and his list of cases that had been published in the newspapers were taken up one by one and he was asked "Didn't you do so and so in that case? Didn't the commission or the court do so and so in this case? Did they not fix a higher rate in the other case? Did they not find a much higher valuation?" and so on all the way down the line and the advertisement wound up with a statement something like this, "If you were seriously injured and it became necessary to employ a surgeon to conduct a serious operation to save your life, whom would you employ? The best and most skilled surgeon you could obtain or would you employ one who admittedly had gained all his knowledge and experience in that particular field of endeavor by reading books and talking with other surgeons?" When that advertisement appeared you could have almost heard the laugh that went over the town. When the mayor came back he postponed the meeting of the council until the following month. That has been almost a year ago and there has not been a session of the town council in that city with reference to that subject since that time and the price has not been reduced in that town up to date. I am simply giving you that illustration showing the power of advertisement in reaching the general public.

Another instance that occurred in practically the same campaign. It became necessary to give notice of the discontinuance of cheap boiler service, — and right here I want to say when I

speak of "industrial service," I do not have in mind boiler service; but I have reference to that high grade business that can afford to pay higher prices rather than discontinue the use of natural gas and that is distinct from boiler service which is another matter altogether. So do not fix in your minds the idea that I am talking about industrial business when I am speaking of cheap boiler service because I am not. I know that you can not put that on the same basis as other kinds of service. In this particular instance we gave notice that boiler service would be discontinued on a certain day. There came considerable opposition from the Chamber of Commerce. The Chamber of Commerce being a very active factor in that city, they called a meeting and a goodly number of representative business men of that city attended the meeting. They proceeded at once to condemn the gas company in unmeasured terms. They were about to pass a resolution condemning the gas company for this so-called unwarranted action in turning off boiler service to the industries of the town. It occurred to them, however, that the gas company might have something to say by way of defense as to why it had taken this action and before passing the resolution they called upon me as the representative of the company to see if I cared to say anything. I told them I was very glad to be there, although I had not been invited and the company had not been notified of the meeting; that we had in our archives a beautifully engraved certificate of membership in their honorable body for which we had paid one hundred dollars per year for the privilege of being a member of the Chamber of Commerce and yet, notwithstanding the fact that we were a member of that body, with dues fully paid up, we had not only not been invited to be present, but the company had had no notice of this meeting. I said that I was very glad to be there and would assist them in any way I could in arriving at a correct understanding of the situation. I had taken the precautions to have with me the monthly statements of the gas company. I laid them down in a stack on top of the desk in front of me and said to them, "Gentlemen, here are the private, confidential statements of this company showing the actual costs of operation, including all expenses, and showing actual receipts from the operation of its business month by month throughout the

year and you can pick out any one month — I do not care which one you take — and if you do not believe I am telling the truth, you may send in any public certified accountant or any competent accountant in this city to examine our books to verify the truthfulness and the accuracy and the correctness of these monthly statements and if you find anything misrepresented or anything not true, then you do not need to believe a word I say." Then I picked up one of the monthly statements at random and it happened to be the month of May. I said to them, "Gentlemen, this statement of our business for the month of May shows that we sold in this city 231,000,000 cubic feet of boiler gas at an average price of so much and this same sheet shows that gas has cost us so much in excess of the price we sold it for. Now as a sound business proposition would any one of you business men have sold the commodity that you were handling on the same basis? I konw you would not. You could not afford to do it and hope to continue in business. We can not afford to do it and hope to continue in business long. We want to be frank and fair minded and straight forward about this whole matter. We are perfectly willing to give you all the facts in relation to our business. We are perfectly willing to show you our books and to convince you that we are telling the truth about what this gas costs us and what we get for it; but from the standpoint of good business, we can not sell you that gas below cost and we do not propose to do it." So before we got through we had hard work to keep them from passing a resolution condemning the mayor instead of us (applause).

MR. JOHN M. GARARD: Mr. President, I do not want all this to go by without this vast audience knowing where I stand. I am so utterly biased on this rate question that what I have to say won't do the outside public any good because the language I would use would not be fit to be recorded in the report of our proceedings and the outside public would not know anything about it. But when I come to consider how we have been belittled and how we have been sat upon by various consumers, both industrial and domestic, I really feel so insignificant that I lose all hope of ever being able to appear and obtain any credit at all, before these various commissions. We are simply the laughing stock of everybody. There isn't any question about it. And

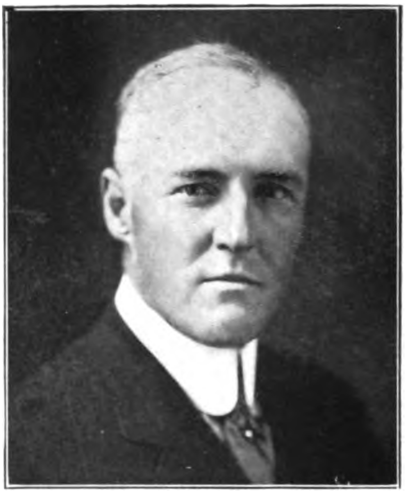
when we thought if we put gas up to sixteen cents, we would lose every customer we had and then wondered why we didn't make it thirty and when we put it at thirty, they said, "Well, we will take just about the same that we have been using," and then we were disappointed because we did not make it forty, but decided to split the difference and make it thirty-five, saying, hereafter any industrial consumer that wants to burn Ohio Fuel Supply gas will pay us thirty-five cents per thousand, even though our domestic rate may only be twenty-five cents in the town in which it is being consumed, we then realized what we had been up against. I am giving out that sweet morsel to take home with you and I hope you will all follow the example of the Ohio Fuel Supply Company (applause).

President Guffey: Gentlemen, it now gives me great pleasure to introduce to you as the next speaker one of our active members who at the present time is giving his time and service so generously and so efficiently to the public, serving in the capacity of Chairman of the Petroleum Oil and Gas Committee of the National Council of Defense. He is also a representative of your Association as its member in the National Chamber of Commerce. In addition to being President of the Hope Natural Gas Company, he is also President of the Standard Oil Company of New Jersey. He has kindly consented to address us this afternoon on Mobilizing Industries for War. I now introduce to you Mr. A. C. Bedford (great applause).

Mr. A. C. Bedford: Mr. President and Gentlemen: I feel somewhat embarrassed in speaking to you today, for the reason that although like you, I am, and I am proud to be a gas man, yet I know very well the limitations of my knowledge relative to the gas business and I could not pretend for a moment to try to address you on that subject alone. My apology for speaking at all must be the desire, if I can, to perhaps bring to you a little of the atmosphere in which I have been moving these last few weeks; to impress upon you if I can, as it has been impressed upon me, the serious condition with which as a country we are face to face; to ask one and all of you one thing, which I know you will do,—and let me say here that I yield to no man in this country in my admiration and my respect,

for this man here, (pointing to large Poster of President Wilson, bearing the inscription "Stand by the President") who as our President uttered those memorable words and that marvelous message to Congress, when he put us into the war (applause), and I want to ask you in the words which are before you, to "Stand by the President" (great applause) ; for in standing by the President you stand by the country which we all love (long continued applause).

Mr. A. C. Bedford then delivered the following address:



MOBILIZING OF INDUSTRY FOR WAR.

By A. C. Bedford.

Modern warfare is no longer a mere contest between armies on the field. Even as late as the Spanish War we heard much of the importance of "the man behind the gun." The man is still important, but the vital, the all-conclusive factor now is the *machine behind the man.*

It is said that at the outbreak of the war in Europe, there were in Russia only forty cartridges available for each soldier. It is reported that whole armies would entrain for the front with only one rifle for every five men. This was the kind of mobilization which Germany considered such a menace that she plunged the world into the most frightful of all human catastrophes.

This Russian mobilization was in truth a mobilization of her men; it was not a mobilization of the machine behind her men.

Some one has said that in essence German men are not

today fighting English or French men, but that German machines are fighting English and French machines. Men group themselves around some terrific engine hidden from sight of their enemies. That engine is filled with explosive and hurled miles away against an invisible object supposed to be located at a certain place. There is no romance, no marching into action behind inspiring leaders, no playing of martial music—little, indeed, more than a terrible, indescribable collision of machines.

Hence while men continue to be important, and the power of men to continue to endure this onslaught upon civilization itself, will eventually determine the issue of the struggle, we find that the supreme problem of modern warfare is the mobilization of the *machine behind the men.* This means the mobilization of the whole economic power of a nation.

The raw material for the machines must be turned out, the food must be produced to feed the workers in the factories as well as the soldiers in the trenches, the coal and oil must be provided to move the engines, the ships and the motor cars must be ready. These are but the more important elements of the situation. The fundamental fact in any warfare is that the economic resources of the whole peoples and nations are directed to out-staying and overwhelming the economic resources of another group of peoples and nations.

If this were merely a war between the individual armies of the two groups of nations, it would be terrible, but relatively short-lived. It is because the entire industrial life of all these nations has become involved that the struggle has taken on a titanic character without precedent in history. This is fundamentally why the length of the conflict is so difficult to forecast; and why its results will be of such far-reaching effect upon the domestic as well as the international relations of every nation in the world.

The outbreak of the war found Germany alone of all the nations prepared for what was about to occur. Her machines were ready, and she had become the most efficient nation in the world. Other countries have had to learn during the war, and out of its terrible experiences what Germany had foreseen.

The experience of England in meeting the problems thus

thrust upon her are most interesting to us because her economic life had been ordered more nearly upon the pattern of our own. England was taken almost completely unawares, and she had to act quickly. We have now had time to consider England's experience, and we ought therefore to be able to avoid some of the steps England has had to take, steps which are destined to have a radical and far-reaching effect upon her future history.

It would be impossible to go into the details of all England has done in mobilizing her industry for war. But let us see if we can get at the fundamental principles which have seemed to guide her main policies. If I may describe those policies in a phrase, it is in the statement that England has operated through an extraordinary development of government activity — a line of policy which the United States has so far (effectively) sought to avoid.

For example, railroad service is, of course, vital to any mobilization either of men or industries. One of the very first acts of England at the beginning of the war was accordingly to take over into Government hands entire responsibility for the management and conduct of the railroads. The English government set up a committee of high railroad officers to carry on the work, but the government itself assumed responsibility for the finances of the companies, merely guaranteeing to each a continuance of the same net earnings which it has been receiving just prior to the war. The result has doubtless enabled the railroads to render a greatly increased service, but it has probably resulted in an enormously increased expense to the country.

Our Government has proceeded upon a different theory. Instead of taking over the railroads and assuming responsibility for them, it has asked the railroads themselves to organize themselves into an effective trans-continental railroad system, abandoning for the moment individual and competitive activities, and devoting themselves during the period of the war to rendering the utmost practicable service for the benefit not only of the Government but of the public at large.

The essence of this plan is that the Government tells the railroads what it wants and the railroads themselves assume responsibility for rendering the service. This places the burden

exactly where it ought to belong, and places a premium upon railroad efficiency and economy, instead of encouraging that wastefulness which would be inevitable if the Government merely guaranteed minimum net earnings, as was done in England.

And right here the question may very properly be raised: If, under the stress of war, acting under strict government supervision and regulation, the railroads can, in cooperation, and with competition practically eliminated, give to the government and the public a greatly improved service, is it conceivable that *after* the war, the railroads should be forced to continue the wastes and losses due to the unnecessary competition practically forced by law prior to the war?

England some time after the war began, took over her coal mines and placed them under Government operation. She is now taking over her shipping companies. She has also absorbed under Government management and control, a large number of industries and munition plants.

Our country has proceeded quite differently in all such details. The President of the United States created an advisory committee of the Council of National Defense. The aim of that committee was to study the industrial resources of the country with a view to mobilizing them for the benefit of the Government in the event of war.

In the great industries such as steel, coal, oil, copper and so on, the Council of National Defense invited leading producers to become members of sub-committees and to co-operate with the Government in securing adequate supplies at fair prices. The plan has up to the present succeeded admirably and will, I believe, continue to prove itself of great service to the Nation.

I wish at this time to pay special tribute to Messrs. Baruch, Willard and Coffin, and others of this Council who have personally done excellent service — giving their entire time and attention without compensation to the work of this Committee.

Secretary Lane referred to the co-operative spirit already shown by the business men of the country in this mobilization of the resources of the United States. "It would surprise the nations of Europe how intense is the spirit of loyalty on the part of our business men and capitalists. They are at the very root and

foundation of the great industry — the war industry — that presents itself on the other side of the water. Now, there are two ways of dealing with a problem of this kind. One way is by the hearty co-operation of the men already engaged in the industry. The other way is by compulsion. My experience in the Interstate Commerce Commission led me to believe that the larger men in the railroad industry had quite as much vision as I had, and if I could show them the importance of an occasion they would try to meet it. So, instead of resorting to compulsion, instead of taking over mines and great operating plants, we are endeavoring to put you men at your best. This war is a challenge to us."

Those are the words of Secretary Lane. How does that come down to us as gas men? It comes to my mind in two ways. It is patent that we are as interested in this as the coal men or the oil men or men engaged in other industries because an important part of the great industries of the country is the gas industry today and an important element is the production of natural gas. Natural gas is as important as petroleum and coal in the mobilization of the industries for war. You know the part it plays. I do not have to tell you. Secondly, it is a question of natural gas itself as a fuel. You all know without me telling you the conditions in reference to coal as a fuel. The Coal Committee is having great difficulty in trying to meet the tremendous demand. You know how the industries of the country have used all the available supplies of coal, so that coal has to be supplemented by natural gas. Therefore, as natural gas men, you have two things to bear in mind. You may be asked — and you will be asked — those of you who manufacture gasoline, to bear your share of the burden. That burden carries with it the necessity of supplying the Allies with their needs and to supply our own fleet and our patrol fleets along our own coasts, as well as to supply our own motor vehicles. There will be 35,000 motor trucks used when our armies come into existence. You can readily see how that has to be taken care of, and the load will have to be distributed through some such medium as I have already described, for the Government is trying to utilize to the best advantage the needs and necessities of those great products which we have to

have in order to keep things moving and to accelerate the pace as it must be accelerated.

Now, I would urge distributing interests, especially in the centers of large population, in so far as is possible, to deliver gas to their customers along normal and ordinary lines without creating unnecessary panic, but to have in mind that when the war comes, your duty probably will be first to see that these great industries upon which war is dependent are supplied with an adequate supply of fuel. For example, the great steel industry needs fuel and it may be that you will have to divert some of your supplies of natural gas, — especially you who live in the Middle West and the East, to the needs of those industries, and this must be of paramount importance, and, Mr. President, if it will not be out of line, I would suggest that this Convention might perhaps appoint a committee that could co-operate and behind which you could all stand, and into whose hands you would be willing to put the burden of working with the Government and working with its Committees so that when the time comes that you will be called upon there may be some medium through which you may act and with whom the authorized authorities at Washington may deal (applause).

Under the plan every producer feels the patriotic obligation to do his best and to deal fairly by the Government. In addition to that he has opportunities still left to him to exercise his skill and productive capacity in improving results, rather than in merely lying down on the Government and letting his plant become a part of the bureacratic machine. We are fighting a war for democracy and it will be a thousand pities if in the stress of such a war we should put bureaucracy on the throne, and eliminate those opportunities for the play of individual initiative, enthusiasm and efficiency which must always be the glory of a democracy (more applause).

This war can, of course, have only one issue. The resources of the democratic nations of the world have been thrown into the seething cauldron of war with an inexorable determination to triumph over the governments of autocracy and despotism. It will be the duty of our people, as the President has so well said, to put into this struggle, every ounce of our ability and every

particle of our resources that may be necessary to secure a complete vindication of the principles for which we are struggling. But this war will also show us some great principles to apply to our domestic life. It will show us the necessity of co-operation. It will demonstrate to our people what can be accomplished by believing in men and by mobilizing our resources for the benefits of peace as well as for the necessities of war.

But, my friends, we must look the facts squarely in the face. Do not let us deceive ourselves with any Short-War fallacy — any such theory will warp and misguide public sentiment — cost countless of human lives, prove German's strongest ally and prolong the war. I have been in somewhat close touch with those who know actual conditions and the best informed experts believe today that the war is not nearly over. They believe its worst and most dangerous stages are yet to come. Barring possible collapse through hunger, Germany can go on for years. Barring possible failure to meet and overcome the submarine campaign, the Allies can go on for years — neither one, I believe, is likely to happen. The only safe basis for this country to proceed upon is to assume that the United States alone is entering upon a war with Germany. A war that will tax its full resources and full fighting strength. Once get that into your thoughts and conviction and America will respond as *one man* for they will realize at once their own and their country's peril (long continued applause).

This country is a long way from the battle fields of Europe and our people feel themselves apart from the conflict, but it will bring it home to you at once if you will imagine for a moment the removal of that mighty fleet which has stood as a protecting shield between this country and Germany since the war began. Imagine that that fleet can not be supplied with necessary fuel, both coal and oil, — that the submarine chasers could not get the needed supplies of gasoline and you can see at once the deadly peril this country would stand in. The entrance of the United States into the war comes at a most opportune moment for helpfulness. For thirty months the Allies have bled and suffered, and the strain has told on them perhaps more than we realize or can ever imagine. France, fighting magnificently, is trenching on her

last reserve of strength. Italy's help, while invaluable, is negative. Russia, dazed by her revolution, is faced with a period of uncertainty and confusion — Great Britain bearing the main burden of the war, the guardian of the Alliance on the seas, — its banker, its chief arsenal and workshop and its main military prop — is drawing on the last million of her available man power, is harassed by the German submarine warfare and is conscious of the pressure of the titanic burden. What that burden is may be conceived in part if I mention just a few facts to illustrate the grand scale of preparation involved, facts that will indicate also the necessity of mobilizing industry in the United States for war. The original English army consisted of 150,000 men. England's present army is 5,000,000 men. In France 2,000,000 men. The remaining soldiers are divided into the armies of Salonica, Mesopotamia, Egypt, German East Africa, India. In addition to the 5,000,000 men in arms, England has more than 3,000,000 men engaged in war industries. She has in reserve another million men, but can ill spare any more men from the land, the collieries, or the factories, and that leads me to say here that in my judgment, producers of oil and gas, where it is needed for fuel for factory purposes should urge upon those men essential to the business that it is their business to remain at their posts, such men as drillers and other experts, to keep up the production, etc. When men are called upon to respond, as they are going to be called upon, only those men should go who can be spared. Some men will be essential to the industry. In those industries, you know those men who are most essential. A man can do his patriotic duty by drilling a well when oil and gas is needed, as well as by bearing arms in the trenches.

Nothing could more strikingly illustrate the essential nature of co-operation by all industries than the development of England's great industry of munitions. There are now nearly one hundred great Government plants which have been specially built to cope with war requirements. Working directly under the Ministry of Munitions are 2,500,000 men and over 1,000,000 women. Women are engaged in more than five hundred munition processes. The production of guns and munitions has multiplied sixfold during the past year. At the beginning of the war, there

was a notable lack of shells. They did not understand how to go to war. They did not understand what it meant. Perhaps you will remember reading in the papers where General French sent back to England word that he had to have shells of high explosive power, and they sent back word to him, "No, you don't want them; you want shrapnel." Then he sent back word that he had shrapnel but it was gone, and they sent back word to him, "If you had not wasted your shrapnel you would have had it now," not realizing what the conditions were, not realizing the tremendous responsibilities in the way of supplying munitions to the army and to the navy, not realizing the high explosives that were necessary to meet the modern engines which had been so highly developed by Germany. The British have moved back and forth across the channel over 8,000,000 men, over 10,000,000 tons of explosives, over 50,000,000 gallons of gasoline and over 1,000,000 sick and wounded. And all this without any losses due to enemy attacks. Marvelous achievement. (More applause). And with great reverence to the memory of the distinguished citizen who died in New York yesterday, and for whom all New York mourns today, I want to echo the words of Mr. Choate for us "to wake up; let us be up and doing and not talking only." England's original navy was 150,000. Her present navy exceeds half a million. In addition to naval requirements, England is obliged to supply all her troops, all her armies in distant parts with their equipment for war and the necessaries of life, and in addition to keep huge fleets busy with the transportation of coal and other essentials to her allies, notably France and Italy. This means an enormous sea force in addition to the regular naval force and the organization and control of this auxiliary navy is one of the great achievements of the war. These things we, too, must do and though the war has been in effect for thirty months, we are much less prepared than England and have an enormous task to perform. Again I echo the recent words of Mr. Choate and say with him, "Wake up; let us be up and doing and not talking only." (Great applause).

To the Allies, therefore, the entrance of these United States brings a stupenduous relief. It sets the seal of absolute certainty upon their work. It ranges a hundred million people behind

them. A navy in daring, valor and efficiency second to none, great wealth and industrial organization of the first order. People ask what can America do? Rather ask, what can America *not* do? (Great applause). Is it men, money, food, raw or finished material? We can supply them all and we will. (More applause).

As to the purpose,—if you will bear with me a moment longer, I can do no better than to quote from that eloquent address made by the Mayor of New York at that great dinner given on last Friday night, May 11th. A dinner where perhaps never before such an array of notable men sat at the same table. There were two former Presidents of the United States, Col. Roosevelt and Mr. Taft. (Applause). There was a former Premier of Great Britain, Mr. Balfour, and a former President of France, Messieur Viviani, both of them leading figures in their respective countries. (Great applause). There was the Marshal of France, General Joffre (long continued applause) and the senior officer of the United States Army. There were the Admirals of the British, French and United States Navies; the British and French Ambassadors; the Governor of the Bank of England, the Governor of the great State of New York, and a thousand other men of distinguished personalities, and famous records, representatives of the financial, literary, artistic, professional and business life of America, on behalf of whom the Mayor addressed these distinguished guests in part as follows:

"This is essentially our war. Democracy destroyed in Europe means democracy first threatened and then destroyed in the United States. At least we see it. America is now awake and New York,—New York that has never hung back or faltered in the hour of the Nation's peril, clasps hands with these our guests and Allies and says to them: 'We are with you in this thing to the bitter end, lead where it may.' Our Hour of Trial is here.

"What can we say to them? Their people have known privations and the sufferings of war. We have not. Democracy on this side of the Atlantic, protected by the British navy, defended by the valiant hosts of France at the battle of the Marne, secured by the armies of the Allies for two years and a half, has pur-

sued its prosperous and peaceful course unshaken by the terrors and the sufferings that have torn Europe. That day is past. The hour of our trial is at hand. It was not to be that American democracy should thrive and live at peace while European democracy fought and suffered to preserve to the world popular self-government. American democracy must now make its sacrfice in the common cause of civilization and of justice, and it is well for the soul and spirit of our nation that this is so.

"Gentlemen of England and of France, our President, speaking for every loyal citizen of the United States, has pledged to you the resources of the United States. Money, ships, munitions, food, — these things we give you freely and we esteem the giving but a light tax upon our unbounded wealth. It is not enough. There lacks the spiritual contribution of manhood, service and blood sacrifice. This, too, must be ours. Our duty will be done, our debt discharged, our destiny achieved only when the hosts of American democracy take their place beside the hosts of England and of France, resolved to fight and fight and still fight until victory rescues the world from autocracy and barbarism." (Long continued applause).

But the country that will benefit most from America's intervention is America itself. Her entrance into the war restores to the United States her old prestige and to Americans a nation of which all may once more be proud. It removes the disastrous misunderstandings of American motives and American character that had begun to obtain in Europe and South America and Mexico. It imposes upon the United States gigantic tasks that will test to the uttermost the quality of her citizenship, the efficiency of her Administration, and of her industrial captains and the will power of her people. Let us, therefore, wage this war as though it were to last for another five years and our very existence as an independent nation was involved, and when victory comes, as come it will, we will be welcomed as an honored member of the family of nations who will ever be honored for all time as those who preserved to the world the principles of civilization, of truth and of honor, and who helped to defeat that attack upon civilization by barbarism, a barbarism that combines the science of the laboratory with the savagery of the

jungle, a barbarism that denies all those doctrines and principles which have been accepted after long years as the proof of human progress and the glory of mankind's advance. (Long continued applause).

MR. JOHN M. GARARD: Mr. President, I feel that a vote of thanks from this Association would be but a feeble effort on our part showing our appreciation of the splendid address just delivered by Mr. Bedford. I know that it has gone to the hearts of every member of the Association. It was a wonderfully instructive and able address. I am not going to say it was a speech. It was way beyond that.

I move you, Mr. President, that by a rising vote of thanks we tender to Mr. Bedford our expression of appreciation for the splendid address and the timely and patriotic suggestions contained therein; that the members of The Natural Gas Association of America here and now pledge themselves to give to the Government all the assistance and co-operation in our power and that we hereby authorize Mr. Bedford to carry back to those from whom he came the message that The Natural Gas Association of America stands behind the President and behind the Government in the gigantic movements now going forward in support of universal democracy and for the betterment of the human race. (Applause.)

MR. MARTIN B. DALY: Mr. President, it gives me peculiar pleasure to second this motion.

The above motion, having been duly seconded, was then unanimously adopted by a rising vote amid long continued applause.

MR. L. B. DENNING: Mr. President, I move that a committee of three be appointed by the President of the Association to convey to the President of the United States a pledge from each member of this Association for the co-operation and support of the Association through its membership to the Government at Washington in securing a successful termination of the present war and that the President of the Association be instructed to communicate the action of the Association of the President of the United States.

Mr. Leslie B. Denning: I heartily endorse the motion and take great pleasure in seconding it.

And thereupon the above motion having been duly seconded was unanimously adopted.

President Guffey: Gentlemen, unless there is some objection I will appoint the following:

COMMITTEE PLEDGING SUPPORT TO THE PRESIDENT: L. B. Denning, C. J. Lockwood, George W. Crawford.

And thereupon after a conference by the Committee, Mr. L. B. Denning on behalf of said Committee presented to the Association the following resolution and moved its adoption:

'*Resolved*, That the Natural Gas Association of America, representing the Natural Gas Industry of the United States of America, unreservedly stands by the President in the present war crisis and pledges the co-operation and support of all its members to the Government to secure a successful termination of the war of democracy against autocracy, and that the President of this Association, Mr. Joseph F. Guffey, be instructed to communicate the action of this Association to the President of the United States.

L. B. Denning,
S. J. Lockwood,
Geo. W. Crawford.

The motion to adopt the above resolution was then duly seconded by Mr. George W. Crawford and unanimously adopted.

Mr. W. Y. Cartwright: Mr. President, I move that a committee of five be appointed by the Chair in conformity to the suggestion contained in Mr. Bedford's address to assist in every way we can in carrying out our pledge of support and co-operation and to work with any committee or committees of the National Council of Defense and especially to work in harmony with the sub-committee of which Mr. Bedford is chairman in furthering the work and in helping perform the gigantic tasks which rest upon the sub-committee and upon the National Council of Defense.

The above motion was duly seconded by Mr. John M. Garard and unanimously adopted.

President Guffey: Gentlemen, with your permission I will announce that committee later.

The next order of business is the report of the Committee on Uniform Accounting of which Mr. H. C. Reeser is Chairman.

Mr. H. C. Reeser then submitted the following:

REPORT OF THE COMMITTEE ON UNIFORM ACCOUNTING.

To the Members of The Natural Gas Association of America:

GENTLEMEN: Your Committee on Uniform Accounting beg to report that they have adopted a tentative scheme of accounts for Natural Gas Companies which in their judgment covers practically all phases of accounting as applied to the Natural Gas industry. The scheme as adopted is the result of practically three years earnest work on the part of the Committee and will tend to standardize the accounts of companies adopting it.

A full meeting of the Committee was held August 15th, 1916, with representatives of the Public Service Commission from the States of Pennsylvania, Ohio and West Virginia. The Committee's scheme was submitted to the gentlemen and was discussed at some length with them. They took our report and promised to give it prompt attention, it being the desire of our Committee that the representatives from these three States agree upon a uniform basis. Up to the present time, the Public Service Commission of these three States have been so busy that those in charge of our work have been unable to hold a meeting for further consideration of our tentative plan, but we are assured that a meeting will soon be held, and that they will either adopt our report as submitted or suggest some slight changes. Awaiting the decision of these gentlemen it was thought advisable not to have the report printed, as it is our desire, after three years work to present to the members of the Association a scheme of accounts which will meet the desires of at least three Public Service Commissions.

Our tentative scheme as submitted covers the accounting in detail and possibly some of the smaller companies would not care to sub-divide their accounts as minutely as it is provided for in our scheme. General heads, however, could be followed to an

advantage by all companies, and we believe would work out to a mutual advantage of both the gas companies and the regulating bodies requiring reports.

As soon as definite action can be secured from some of the Public Service Commissions, our report will be printed, and copies will be available through the office of the Resident Secretary.

I wish to take this opportunity of acknowledging my appreciation of the assistance of the Gentlemen serving on the Committee.

H. C. REESER,
Chairman.

MR. JOHN M. GARARD: Mr. President, I move that the report of the Committee on Uniform Accounting as read by Mr. Reeser, its chairman, be accepted and placed on file and spread upon our minutes and that the Committee be continued for the ensuing year.

MR. KAY C. KRICK: I second the motion.

The above motion, having been duly seconded, was then unanimously adopted.

PRESIDENT GUFFEY: I will next call upon Mr. S. S. Wyer for the report of the Committee on National Gas Safety Code.

Mr. Samuel S. Wyer of Columbus, Ohio, then submitted the following:

REPORT OF COMMITTEE ON NATIONAL GAS SAFETY CODE.

To The Natural Gas Association of America:

GENTLEMEN: As your representative on the Advisory Engineering Committee that is advising with the United States Bureau of Standards, Washington, D. C., in the preparation of a National Gas Safety Code, I submit the following as a summary of the year's work:

The Bureau has been seriously handicapped for want of funds, and for this reason has been unable to carry on the work very much farther than was indicated in my last year's report.

Additional funds will soon be available, and it is the Bureau's expectation to do considerable work on the code this year.

Respectfully submitted,

SAMUEL S. WYER.

MR. SAMUEL S. WYER: I am able to emphasize the statement that was brought out in last year's report, namely, that as far as the code has gone it does not contain anything that any gas company need be afraid of and it will contain many things that will be of direct benefit to the industry. The present indications are that the code will be complete within the next eighteen months or two years.

PRESIDENT GUFFEY: Gentlemen, you have heard the report. What is the wish of the convention?

MR. KAY C. KRICK: I move that the report be accepted, placed on file and spread upon the minutes of the Association and that the work be continued by the Committee for the ensuing year.

MR. J. H. MAXON: I second the motion.

The above motion having been duly seconded, was then unanimously adopted.

PRESIDENT GUFFEY: I would like to call your attention to the fact that the beefsteak dinner will be held in the room above us this evening at six-thirty o'clock.

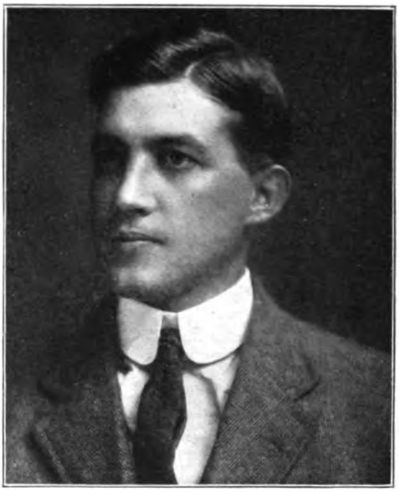
On motion duly seconded and carried the meeting then adjourned until Thursday, May 17, 1917, at ten o'clock A. M.

THIRD DAY—MORNING SESSION.

THURSDAY, MAY 17, 1917.

PRESIDENT GUFFEY: Gentlemen, please come to order. The first paper this morning is on the subject of "Deep Well Drilling" by Mr. A. R. Gray, Assistant to General Superintendent, Peoples Natural Gas Company. Mr. Gray is unavoidably absent and Mr. F. L. Hadley, Superintendent of Lines, Peoples Natural Gas Company, has kindly consented to read the paper.

Mr. F. L. Hadley then read the following paper:



DEEP WELL DRILLING.

By A. R. Gray.

The gradual exhaustion of oil and gas has stimulated an effort to secure deeper producing horizons in regions in which compressor stations and pipe lines have already been constructed.

That drilling to great depth can be successfully carried on seems open to little doubt. In 1860 when the search for oil and gas was actively begun in the Appalachian Basin, few, if any, wells were drilled as deep as 1,000 ft. In 1890 when development was at its height 3,000 ft. was considered an unusual depth. By 1910 several holes had been drilled to a depth of more than 5,000 ft. and at the present time at least two (2) wells in the world have been drilled more than 7,000 ft. deep.

In 1898 the Forest Oil Co. drilled what at that time was the deepest well in the U. S. This well was drilled at West Elizabeth, Allegheny County, Pennsylvania, 12 miles southeast of Pittsburgh on the Wm. Bedell Farm. It was the intention to

drill to the corniferous Limestone, but owing to an accident the tools and 1,000 foot of cable were left in the hole at 5,575 feet. Every effort was made to fish them out but without success; then an effort was made to dissolve the tools and cable with sulphuric acid, but after two years of effort the hole was finally abandoned. The following record of the Bedell well shows the formations, temperatures, casings, etc.

Slate	40	to	40	
Bottom of 10″ casing at	40	"	50	
Limestone	10	"	50	
Shales	80	"	130	
Slate	105	"	235	
Sand	30	"	265	
Slate	40	to	305	
Coal (Bakerstown)	3	"	308	
Slate	100	"	408	
Bottom of 8¼″ Csg. at	360	"	360	
Coal	2	"	410	
Slate	75	"	485	
Sand	40	"	525	(Temperature 57° Fahr.)
Shale	10	"	535	
Coal (L. Freeport)	2	"	537	
Slate	25	"	562	
Sand	65	"	627	
Shale	15	"	642	
Coal (M. Kittanning)	3	"	645	
Limestone	10	"	655	
Slate	30	"	685	
Limestone	15	"	700	
Slate	50	"	750	
Sand	35	"	785	
Slate	5	"	790	
Salt Sand	95	"	885	
Slate and shells	115	"	1000	
Slate	30	"	1030	
Red Rock	20	"	1050	
Limestone (Big M't., etc.)	50	"	1100	
Big Injun	310	"	1410	
Bottom of 6¼″ casing at 1320′	...	"	1320	
Slate and Shells	60	"	1470	
Sand	15	"	1485	
Slate	7	"	1492	
Sand	5	"	1497	

Slate	18	"	1515	
Sand, (Berea?)	50	"	1565	
Slate and shells	60	"	1625	
Limestone	10	"	1635	
Slate and shells	100	"	1735	
Sand (Gantz?)	25	"	1760	
Slate and shells	20	"	1780	
Limestone	10	"	1790	
Slate	20	"	1810	
Sand	15	"	1825	
Slate and shells	45	"	1870	
Sand	20	"	1890	
Slate	5	"	1895	
Sand ("Thirty-foot")	40	"	1935	
Slate	3	"	1938	
Sand "Stray"	18	to	1956	
Slate "Stray"	30	"	1986	
Sand "Stray"	7	"	1993	
Red Rock	3	"	1996	
Sand, (Gordon, Third, etc.)	65	"	2061	
Red Rock	5	"	2066	
Sand (Fourth)	30	"	2096	
Red Rock and shells	15	"	2111	
Slate and shells	15	"	2126	
Sand	5	"	2131	
Slate	3	"	2134	
Sand	18	"	2152	
Redrock and shells	30	"	2182	
Sand (Fifth or McDonald)	25	"	2207	
Redrock and shells	35	"	2242	
Slate	10	"	2252	(Temperature 64° Fahr.)
Sand	5	"	2257	
Slate and shells	25	"	2282	
Sand (Bayard)	5	"	2287	(Gas, volume 25 lb. per min.)
Sand	10	"	2297	
Redrock	25	"	2322	
Slate and shells	75	"	2397	(Temperature 78° Fahr.)
Sand (Elizabeth)	3	"	2400	
Shells	200	"	2600	
Slate	150	"	2750	
Slate and shells	200	"	2950	
Slate	100	"	3050	
Limestone and shells	100	"	3150	
Sand (Speechley?)	15	"	3165	

Slate	335	"	3500	
Sand (Bradford) trace of oil	20	"	3520	
Slate and shells	175	"	3695	
Slate and shells	195	"	3890	
Slate and shells	140	"	4030	
Slate and shells	180	"	4210	
Slate and shells	190	"	4400	
Slate and shells	75	"	4475	
Slate	23	"	4498	
Shells	2	"	4500	
Slate	32	"	4532	
Shells	13	"	4545	
Slate	25	"	4570	
Limestone	20	"	4590	
Slate	10	"	4600	
Sand	30	to	4630	
Slate	40	"	4670	
Limestone	20	"	4690	
Slate	20	"	4710	
Shells	15	"	4725	
Slate	15	"	4740	
Slate and shells	10	"	4750	
Sand	20	"	4770	
Slate	10	"	4780	
Limestone	10	"	4790	
Slate	20	"	4810	
Shells	10	"	4820	
Slate	20	"	4840	
Limestone	15	"	4855	
Slate	20	"	4875	
Shells	10	"	4885	
Slate	5	"	4890	
Slate and shells	10	"	4900	
Slate	15	"	4915	
Shells	5	"	4920	
Slate	30	"	4950	
Shells	5	"	4955	
Slate	45	"	5000	
Limestone	10	"	5010	(Temperature 120° Fahr.)
Slate	10	"	5020	
Slate and shells	10	"	5030	
Slate	20	"	5050	
Limestone	10	"	5060	
Slate	10	"	5070	
Slate and shells	10	"	5080	

Slate	10	"	5095	
Slate and shells	5	"	5100	
Limestone	5	"	5085	
Slate	30	"	5130	
Limestone	10	"	5140	
Slate	20	"	5160	
Limestone	10	"	5170	
Slate	10	"	5180	
Limestone	50	"	5230	
Slate	30	"	5260	
Limestone	10	"	5270	
Slate	20	"	5290	
Limestone	5	"	5295	
Slate	25	"	5320	
Limestone	10	"	5330	
Slate	30	to	5360	
Limestone	5	"	5365	
Slate	15	"	5380	(Temperature 127° Fahr.)
Limestone	10	"	5390	
Slate	20	"	5410	
Slate and shells	20	"	5430	
Slate	15	"	5445	
Limestone	5	"	5450	
Slate	20	"	5470	
Slate and shells	10	"	5480	
Slate	20	"	5500	
Slate	75	"	5575	(Bottom of 6¼" hole.)

Since the drilling of the Bedell well there have been at least a dozen wells drilled to a depth of from 4,000 to 5,500 ft. in addition to which the Hope Natural Gas Company has twenty-five (25) deep wells located and drilling in West Virginia. It has completed eight (8) deep wells at an average depth of 4,600 ft. below the Pittsburgh Coal. It also drilled one well to 6,390 ft. but unfortunately plugged the hole at that depth.

There is a well being drilled at Valcano, West Virginia, in which this company has 4,000 ft. of 10" hole. Unless production is found, the well may be a very deep hole when completed as the great depth of 10" hole will give a good chance to continue. There is also a well drilling on the Goff farm near Clarksburg, West Virginia, in which there is already 6,500 feet of 8" hole.

The deepest well in the world at the present time was drilled to a depth of 7,349 feet at a location near Luchow, Germany.

The next deepest well in the world and the deepest in the U. S. is being drilled by the Peoples Natural Gas Company on the R. A. Geary farm in Washington County, Pennsylvania, near McDonald. At the present time this well is 7,247 feet in depth and delayed by a fishing job.

This well was commenced November 7, 1911. The rig is of oak, 26 foot base and is 90 ft. high, double legged and the legs reinforced by having 6 x 6 oak timber run from base to crown block inside of legs. The Band Wheel is 13 ft. in diameter, with 7½" shaft, Bull Wheels 24 feet in diameter with 6" Steel Gudgeons using three (3) Tug Ropes and 2-12" Brake Bands. The Sand Reel is 15 ft. long with 5" shaft and 43" Friction Pulley.

The Engine used is a 14 x 14 Ajax 52 H. P.; steam being furnished by 2—25 H. P. Boilers. The belt was specially and is 105 feet by 16".

The tools used were all standard.

The Crown Pulley is a special wire line pulley 38" in diameter with 6" Steel Gudgeons and weighs 700 pounds.

Up to the present time there have been 10 cables and 3 Sand Lines used.

The first cable used was a 1" Wire Line Cable 7,000 ft. long.

The next seven (7) cables were 8,000 ft. long and on account of the weight were built specially being tapered, 1¼", 1⅛" and ⅞" respectively, the taper being about 500 feet long. The last two (2) cables were 10,000 ft. long and were 1¼", 1⅛", 1" and ⅞" taper being about 150 feet long. All of the cables except the first one were made to special order.

The Sand Lines used were 9/16" x 8,000 ft.

In drilling a 16" hole was started and at 232 ft. a string of 13" casing was put in. The 13" hole was drilled to 1,050 feet and a string of 10" casing put in, 10" hole drilled to 1969' and a string of 8¼" casing put in, 8¼" hole to 6,053' and a string of special 6" casing 6,053' weighing 68 tons put in, 5¾" hole drilled to 7,247 ft. and a string of special 4¼" I. D. x 5¼"

O. D. Casing weighing 62 tons put in. This string of casing had welded joints instead of collars, making it one continuous piece.

There have been a large number of fishing jobs on this well. At one time there were three (3) strings of tools in the hole together.

From 4,850 ft. to 6,060 ft. there were pockets of gas which blew the tools up in the hole and kinked the cable causing it to break. These were not serious fishing jobs as two or three days' work would usually clear the hole. The pockets of gas were formed at 4,850, 4,870, 5,900, 5,905, 5,910, 5,915, 6,060. The gas did not continue to flow, seeming to exhaust with the first puff.

There was a string of tools and 4½" bailer lost at 6,065.

After a long, tedious fishing job it was decided to drill by them. This was done and the tools were cased off. Another string was struck at 6,925. After an unsuccessful effort to get these tools, the company again drilled by them and went to a depth of 7,181 when the first string slipped down catching the second string at the bottom of the hole. After a long fishing job the top string was fished out but the drillers were unable to get the bottom string. Again they drilled by them and cased them off.

After putting in the last string of casing drilling was again commenced. After making about 17 feet the casing collapsed catching the tools at the bottom of the hole.

At present they are endeavoring to get casing and tools out.

At a depth of 6,260 feet a large body of salt water was struck which filled up the hole 4,000 feet. The specific gravity of the water was 1.1085 and an analysis shows as follows:

PARTS PER 100,000.

Alkalinity as calcium carbonate	5.50
Calcium chloride	4,421.40
Magnesium chloride	251.60
Sodium chloride	5,018.20
Sulphuric anhydride	Trace

Iron Oxide	Trace
Sediment (rock powder)	224.60
Total solids	9,921.80
Total solids exclusive of pulverized rock sediment	9,696.70

The record of the formation and temperatures following are of interest.

R. A. GEARY WELL NO. 770.

110' Below Coal.

Formation.	*Top Feet.*	*Bottom Feet.*
Conductor	16	....
13" Casing	232	....
Limestone	450	470
Slate	470	595
Freeport Coal	595	600
Water	600	....
Gas	760	....
Salt Sand	734	950
Gas	912	....
Pencil Cave	950	953
Big Lime	953	982
10" Casing	953	....
Big Injun Sand	982	1241
Gas	1052	....
Squaw Sand	1378	1392
Gas	1379	....
Sand	1610	1622
Hundred Foot Sand	1794	1817
Gas	1797	....
Thirty Foot Sand	1910	1925
Gas	1912	....
Gordon Stray	1968	1971
8¼" Casing	1969	....
White Slate	1971	2990
Limestone	2990	3210
White Slate	3210	3440
Reduced Hole	3440	....
Limestone	3440	3450
White Slate	3450	4100
Sand and Lime	4100	4170

Formation.	*Top Feet.*	*Bottom Feet.*	
White Slate	4170	4520	
Black Slate (Temp. 5150′—110° Fahr.)	4520	4550	Explosive Gas Flow at 4850′-4870′
White Slate (Temp. 5220′—120° Fahr.)	4550	5200	
Black Slate	5200	5320	
Black Shale	5320	5520	
White Slate	5520	5660	
Limestone (Supposed Guelph)	5660	5680	
Black Lime (Supposed Niagara)	5680	5788	Explosive Gas Flow at 5900′-5905′-5910′
Black Slate (Temp. at 5800′—140° Fahr.)	5788	6008	
Black Lime	6008	6023	5915′
Flint (Temp. at 6000′—100° Fahr.)	6023	6045	Explosive Gas Flow at 6060′
Gray Sand	6045	6200	
6⅝″ Casing	....	6053	
Water and Gas	6045	....	Temp. at 6095′—156° Fahr.
Brown Sand	6200	6260	
Water	6260	6265	
White Sand	6260	6270	Taken in water at 6270′—156° Fahr.
Brown Sand	6270	6315	
Black Lime	6315	6395	
Sand and Black Flint	6395	6405	
Black Lime	5405	6515	
White Sand	6515	6530	
Gas	6522	....	
Water	6520	6530	
Black Limestone	6530	6610	
Gray Limestone	6610	6700	
Rock Salt	6700	6708	
Lime and Sand	6708	6775	
Rock Salt	6775	6785	
Limestone	6785	6830	6925
Rock Salt	6830	6870	
Lime and Sand	6840	6860	
Rock Salt	6860	6865	
Limestone	6865	6870	
Rock Salt	6870	6875	

Formation.	*Top Feet.*	*Bottom Feet.*	
Limestone	6875	6895	
Rock Salt	6895	6900	
Limestone	6910	6925	Tools
Limestone and Sand	6925	7020	
Salt and Lime Shells	7020	7040	
Sand and Lime	7040	7247	

Another interesting feasure, in case gas is found at these depths is the enormous Rock Pressure which is likely to be encountered. On the basis of known pressures, the pressure should be over 3,000 pounds.

The producing formation which the company is searching for in the deep hole is explained by Dr. I. C. White in his "Note on a very Deep Well near McDonald, Pennsylvania." Extracts from which follow.

LOCATION AND DEPTH OF WELL.

To Pennsylvania belongs the honor of the deepest boring in America. A well on the land of R. A. Geary, about 5 miles northwest from the town of McDonald, near the line between Allegheny and Washington counties, has now attained a depth of 6,052 feet. This hole is being drilled by "The Peoples Natural Gas Company," a former subsidiary of the Standard Oil Company, of which Mr. John G. Pew, of Pittsburgh, is president and L. F. Barger general superintendent, and it is through their courtesy and that of Mr. J. B. Corrin, assistant superintendent of the Hope Natural Gas Company, that the writer was given access to the geologic data developed by the boring. Mr. Pew has chosen for the location of this deep well test the summit of the Condor dome, a structural feature in the rocks described in the Burgettstown-Carnegie Folio by E. W. Shaw and M. J. Munn, of the United States Geological Survey. On this dome the Pittsburgh coal attains an elevation of 1,180 feet above tide, the well mouth being at 1,050 feet, or 130 feet lower, thus beginning at exactly the same geologic horizon as the deep well (5,575 feet) drilled on the farm of William Bedell, 20 miles southeast of the Geary Well, near West Elizabeth, Allegheny

County, Pennsylvania, by the late W. J. Young, of the Forest Oil Company, the detailed log of which is published in volume 1 (A) of the West Virginia Geological Survey, pages 103-107, and which remains the deepest boring in the United States up to the latter part of 1912, when it was surpassed by the one herein described and by another in West Virginia, which has now attained a slightly greater (5,595 feet) depth.

PURPOSE OF THE WELL.

The Condor dome of the Burgettstown quadrangle has already produced a large quantity of natural gas from the Pottsville, Big Injun, "Hundred-foot," and Thirty-foot Sands, and Mr. Pew and his field superintendent, Mr. Barger, concluded that this region, from which the strata dip in every direction, would be a good location to make a test for any oil or gas bearing sands that might be found lower in the geologic column, hoping finally to reach the CLINTON and even the TRENTON LIMESTONE, the two great gas-bearing and petroliferous horizons of Ohio. The writer figures that the Clinton horizon should be struck in this well at about 7,000 feet and the Trenton at approximately 8,000 feet.

METHOD OF CONSTRUCTION.

A steel cable is in use, the derrick has double strength, and a larger engine and more boiler capacity have been provided than in drilling wells to the usual depths, so that Mr. Pew confidently expects to make the Geary well the deepest one in the world. Some trouble has been experienced by the caving of the walls in the soft shales above the Corniferous limestone, but when the temporary fishing job now on hand (a set of tools having been caught by the caving shales) is completed, the bore-hole will be lined with steel casing, so as to prevent any further trouble from caving.

RESULTS OF TEMPERATURE DETERMINATION.

As is well known, Prof. William Hallock, of Columbia University, made careful temperature tests on the West Eliza-

beth or Bedell well down to a depth of 5,000 feet, where the temperature was 120.9° Fahrenheit, and he also tested the Wheeling, West Virginia, deep well, finding a temperature of 110.3° Fahrenheit at 4,500 feet, and the two wells agreed very closely in temperatures throughout at the same depths. Figured on the basis of increase from 4,500 feet to 5,000 feet in the Bedell well, a temperature of about 144° Fahrenheit should be found in the Geary well at 6,052 feet, its present depth, and this estimate is probably very nearly correct, since Mr. Pew reports that a temperature of 140° Fahrenheit was recorded at 5,800 feet in the Geary well, which is about what the West Elizabeth and Wheeling results indicate for that depth.

DISCUSSION OF THE SECTION.

The interval in the Geary well from the base of the Berea Grit (1,622 feet) to the top of the Corniferous limestone (6,008 feet) is 4,386 feet, while on the south shore of Lake Erie, near Elyria, Ohio, 115 miles to the northwest, this same interval is only 800 feet. These intervening Devonian shales, however, increase rapidly in thickness southeastward, since at Akron, Ohio, only 35 miles from Elyria, they have a thickness of 1,862 feet, an increase of 30 feet to the mile; while from Akron to the Geary well, a distance of 80 miles, this thickening (1,862 feet to 4,386 feet), 2,524 feet, continues at only the slightly greater rate of 31½ feet to the mile. This southeastward thickening of 31½ feet to the mile from the region of Akron will furnish a convenient measuring rod for estimating the depth at which the Corniferous limestone may be found, and consequently the Clinton and Trenton petroliferous rocks below, over the present oil and gas fields of western Pennsylvania and West Virginia. According to the elder Orton, the top of the Corniferous limestone falls from 225 feet below tide at Elyria to 925 feet below at Akron, or at the rate of 20 feet to the mile, while from Akron to the McDonald region the descent is at the rate of 40.3 feet per mile, or double the rate to Akron, since the top of the Corniferous lies at 4,950 feet below tide in the Geary well. This rapid dip of the lower formations should lead to the accumulation of some oil and gas pools in

the porous zones of the Clinton and Trenton petroliferous horizons along the interrupted or terrace structural belts of these horizons between Akron and McDonald; and since the Geary well is located on a well-marked dome in the surface rocks which has proven very prolific in all of the higher porous sand reservoirs, gas will most probably be found with very high rock pressures in the Clinton and Trenton horizons at this location, should the rocks in question have sufficient porosity to afford good reservoir capacity.

It is interesting to note here the presence of a limestone (Selinsgrove) horizon as a portion of the Marcellus shade group, first described by the writer in Report G 7 of the Second Geological Survey of Pennsylvania, from the region of Selinsgrove, on the Susquehanna River, in Northumberland County, as also the Corniferous limestone with its included flint nuggets, and the underlying Oriskany sandstone in which the well was drilling when the tools were temporarily lost.

THE GAS AND ITS CONTROL.

While passing through the black slates and shales of the Hamilton series above the Corniferous limestone several successive pockets of gas were encountered. These had such an enormous initial pressure that the escaping gas would blow the heavy tools several feet up in the hole, occasionally giving trouble from breaking of the wire cable, when they would drop back after the sudden flow of gas had passed, and whose approach to the surface could be heard in advance with an intense roaring noise.

It will prove an interesting problem to confine and control any commercial deposits of natural gas that may be found in the Clinton horizon of this well at an approximate depth of 7,000 feet, since if the rock pressure increases in the same proportion as is customary with depth, namely, about 45 pounds to the square inch for every 100 feet of depth, the gas pressure in the Clinton horizon should approximate 3,000 pounds, a figure with which the oil and gas engineers have had but little experience, since no natural gas pressures have yet been recorded, in the Appalachian field at least, which exceeded 1,500

pounds. As one means of dealing with an immense pressure, and one which appears entirely feasible, Mr. Barger of The Peoples Natural Gas Company, plans to let the gas feed into the porous sands whose gas has been largely drained from the upper portion of the boring, thus refilling these exhausted reservoirs and finally restoring their original rock pressures, or even exceeding them, from which the gas can be led into the field lines under the customary rock pressures of these upper sands. In this event these higher sands would act in the same manner as a reducing or regulating valve does in stepping down high pressures to lower ones along the present transmission lines before the gas reaches the point of consumption.

FACILITIES OFFERED FOR SCIENTIFIC RESEARCH.

Mr. Johnson, of the United States Bureau of Standards, will have charge of and be given every facility for securing accurate temperature measurements of this deep well, and as the locality is in the undisturbed region when Dr. William Hallock has done such excellent pioneer work along this line, very interesting and valuable results may be expected, especially if the boring shall attain a depth of 8,000 feet or more, which Mr. Pew says it will, if money, machinery, and expert drillers can succeed in making a hole in the earth to that great depth. Too much praise cannot be given Messrs. Pew, Corrin, Barger, and others, connected with The Peoples Natural Gas Company for the public spirit they have shown in dedicating this expensive well to the interests of pure science.

POSTSCRIPT.

Under date of May 27, 1913, Mr. L. F. Barger, general superintendent of The Peoples Natural Gas Company, has furnished additional data concerning this most interesting well. The drill had attained a depth of 6,052 feet on December 31, 1912, when this paper was read at New Haven, and a set of drilling tools was then in the hole, caught by the caving shales above. The tools were finally recovered, and to prevent any recurrence of such troubles the $6\frac{5}{8}''$ casing was inserted at

6,053 ft., 8 feet in a brownish gray sand, which the writer tentatively identifies with the Oriskany. The record from the bottom of the Corniferous flint at 6,045 feet down to the present depth on May 27th, 1913, is given as follows by Mr. Barger.

	Thickness Feet.	*Total Feet.*
Sand (water and gas 6,060 feet)	155	6,200
Brown Sand	60	6,260
White Sand (salt water, 6,260 to 6,265 feet)	10	6,270
Brown Sand to bottom	29	6,209

The analysis of the water formed at 6,260 ft. looks as though we had here a case of fossil ocean water imprisoned since mid-Paleozoic time. An effort is being made to exhaust it by pumping, so that the well can be drilled to much greater depths in search of the Clinton or Medina petroliferous beds, and possibly to the Trenton horizon, 1,000 feet lower.

The immense quantity (239) feet of sandstone at the horizon of the Oriskany, which continues below the present depth, was unexpected at this locality, but is duplicated at the Lehigh River, in Carbon County, Pennsylvania, as described in the writer's Report on Pike and Monroe Counties, G 6, of the Second Geological Survey of Pennsylvania, page 124, where the Stormville shales and sandstones at the top of the Lower Helderberg series appear to have coalesced with the Oriskany beds, thus forming one great mass of sandstone over 200 feet in thickness. Hence it is possible that this 239 feet of sandstone may represent a portion of the Lower Helderberg rocks, since a regular sandstone bed, the Deckers Ferry sandstone of Monroe County, Pennsylvania, sometimes occurs well down toward the base of this group of rocks.

Mr. Pew and Mr. Barger will make every effort that financial resources and drilling talent can supply to sink this well to a depth of 8,000 feet, thus making it the deepest well in the world and rendering available a knowledge of the thickness and character of the underlying Paleozoic beds of this interesting locality, so far removed from any exposure of these rocks, the nearest Oriskany outcrops being at Altoona, Pennsyl-

vania, and Keyser, West Virginia, each of which is nearly 100 miles distant and in the heart of the Allegheny Mountains.

The great reduction in temperatures found at 6,000 feet is due to the sudden expansion of natural gas, a small flow of which under great pressure (probably 2,500 pounds or more to the square inch) was encountered near and below that horizon. The temperature of 156° Fahrenheit, recorded first at 6,095 feet, is, however, so much greater (156° to 140°), namely, 16°, than that (140°) recorded at 5,800 feet that it probably was elevated a few degrees by the pounding of the drill on the hard sandstone, and this looks all the more probable, since the water found at 6,250 feet has only the same temperature (156°), which itself reveals a rapid increase in gradient below 5,800 feet, or at the rate of 1 degree for every 29 feet. The results of other temperature measurements on this well at greater depths will prove of surpassing interest.

DISCUSSION.

PRESIDENT GUFFEY: We would be very much pleased to hear any remarks from any member of the Association on this important subject if any of you care to discuss it.

MR. J. C. McDOWELL: Mr. President, I wish to express my very high appreciation of the paper as prepared by Mr. Gray and read by Mr. Hadley. It is the most valuable compilation of statistics and information on this subject extant. I am very glad to have it in this form and know that it is to go into the records of the proceedings of our Association.

I have only one suggestion to make and I make that to Mr. Gray through Mr. Hadley, and that is this, if he would have their Geologist make a general geological section of Western Pennsylvania, as we are all familiar with it, and show just exactly where, on a plate in the back of this paper, this occurs in that geological section, it would be of great benefit to all of us. Any of us can dig it out who are at all familiar with the geology of that section of the country, but to the average man who reads this valuable paper it would be a great satisfaction to him if that were done. Therefore, if consistent and agreeable, I would

suggest that it be done and that it be inserted as an additional leaf.

PRESIDENT GUFFEY: Mr. Hadley, will you attend to that?

MR. F. L. HADLEY: I will speak to Mr. Gray in regard to it.

PRESIDENT GUFFEY: If there is no further discussion, we will proceed with the next paper entitled "Wrought Iron Pipe for Use in Natural Gas Field", by Mr. James Aston of the A. M. Byers Company.

MR. JAMES ASTON: In preparing this paper on "Wrought Iron Pipe for Use in the Natural Gas Industry," I refrained from speaking of the details of the manufacture of the pipe and also of the details of the process by which the materials are obtained. I endeavored to state the characteristics of the materials which result from these processes and the adaptability of these materials — steel as contrasted with wrought iron — for service requirements in the gas industry. If we consider the various stages of the gas industry, the service requirements are probably more severe and more diversified in character than we find in any other particular industry.

Mr. James Aston then read the following paper:

WROUGHT IRON PIPE FOR USE IN NATURAL GAS FIELD.

BY JAMES ASTON

The recovery and distribution of natural gas is so dependent upon pipe that a paper dealing with the characteristics and adaptability of certain available products may not be out of place at this meeting. This is particularly true since in several places in which pipe is employed, there is variation in the nature of the service requirement, and a certain quality or characteristic which may be essential or desirable in one class of service may be entirely subordinated where other requirements are predominant.

Welded pipe is of greatest importance by far. The details of manufacture of this product were so well treated in a paper presented before this association a few years ago, that it would appear to be unnecessary repetition to deal with this phase of the subject at the present time, since operating methods in forming and welding pipe are essentially common to both wrought iron and steel. Your association is primarily con-

cerned with the suitability of the products for your conditions of service, and to this end you are more interested in the characteristics and properties of the material from which the pipe is made, than in the methods for its manufacture, or even in the details of processes by which the base material itself is obtained.

Two classes of material are of importance in the manufacture of welded pipe for natural gas service — steel and wrought iron. Both are the products of the refining of a more impure pig or cast iron. The fundamental chemical principles by which this purification is accomplished are the same in both cases, but details of operation and equipment differ in the two processes, so that steel is markedly different from wrought iron in both chemical and physical characteristics. The essential features are as follows:

STEEL. (a) *Bessemer.* The Bessemer process effects a rapid purification of a large charge of molten pig iron (15 tons in 15 minutes) by blowing air under high pressure through the bath of the metal. Of the impurities eliminated, carbon passes off as gas, while the other ingredients unite to form a fluid slag. The finished charge is poured from the furnace in a molten condition into molds, which form an ingot that is rolled into the skelp required for pipe manufacture. And because both steel and slag are molten, the latter is entirely separated by flotation, and none appears in the final product.

Drawbacks of the Bessemer process are (1) lack of control and consequent irregularities of product, due to character of equipment and rapidity of operation; (2) failure to effect any elimination of sulphur and phosphorus; (3) manganese must be added to the finished charge to counteract otherwise detrimental effects of the process; (4) segregation, that is, irregular distribution and concentration into localized zones during solidification, of the comparatively large quantities of impurities which are present due to non-elimination or addition; (5) entire elimination of the slag.

It is well recognized in engineering practice that Bessemer steel is the least reliable of all steels, and that the situation is

growing worse, rather than better, with steady deterioration in the quality of ore and other raw materials of manufacture. For years, open hearth steel has been demanded for structural shapes, boiler plate, and the highest grades of steel; and of late years Bessemer steel rails are being steadily superseded by the open hearth product. Bessemer steel is the material entering into the manufacture of the bulk of merchant pipe and oil and gas country tubular goods.

(b) *Open Hearth.* The Open Hearth process refines large heats (50 to 100 tons) in a period of 8 to 12 hours. The character of equipment and process admits of control during operations, and a higher degree of refining may be accomplished than in Bessemer working. However, many of the drawbacks of the Bessemer process are present, since the fluid condition of the finished charge results in elimination of all slag; also manganese additions are made to the heat, and there is the same opportunity for segregation.

WROUGHT IRON. Good wrought iron is made by refining pig iron of proper grade in a puddling furnace. A small charge (560 lbs.) is first melted down, and then refined by suitable additions of iron oxide in the form of ore or roll scale. Complete and uniform refining is ensured by hand rabbling or stirring of the heat. The total time of a heat is 1¾ to 2 hours. As in steel making, carbon is eliminated as a gas, while the other constituents which are removed unite to form a slag of glassy character. As contrasted with steel making, however, the furnace temperature in puddling is so low that the iron is finished in a pasty, non-fluid condition, and in consequence is removed from the furnace as a spongy ball, throughout which there is uniformly disseminated a considerable portion of the slag. Part of the slag is expelled by squeezing the ball of iron; but just as it is impossible to expel all of the water from a sponge by pressure alone, so we cannot eliminate all of the slag from the puddle ball by squeezing, and there remains about 1½ percent (by weight) of the slag mechanically mixed with the highly refined iron.

The puddle balls are rolled into bars (muck bars) which,

in turn, are sheared to short lengths, built up into piles, and after heating to welding temperature, are rolled into finished skelp or plate. The repiling and rolling of the muck bar ensures uniformity in the skelp because of distributing the even slight differences which it is possible to have in the individual bars; also we realize the benefits of additional work put upon the metal, and accomplish a finer distribution of the slag through this additional reduction of sectional area during rolling.

Well made wrought iron has the following characteristics:

1. A high purity of base metal.
2. Uniformity in chemical and physical character of the base metal.
3. Absence of segregation because (a) there is a virtual absence of those impurities which segregate (b) the final stages of refining are carried out upon a non-fluid metal, while segregation can result only by concentration in a liquid during solidification.
4. No additions of manganese or other elements are made to the refined metal.
5. There is a thorough and uniform distribution of slag throughout the metal. This is mechanically incorporated in the form of a multitude of minute threads or ribbons, which may be likened to a series of fine meshed screens, with the meshes no wider than 1/500 to 1/1000 inch in both width and thickness of the skelp. In other words, there are from one-half million to one million of these filaments per square inch of section of the metal.

Steel and wrought iron differ chemically and physically. All steel carries appreciable manganese, and in general is not so pure as to base metal as well puddled wrought iron.

This difference is especially pronounced in comparing wrought iron and Bessemer steel, the most important metals entering into pipe manufacture. In addition, and of primary importance, no steel making process results in a product within which there is incorporated that slag which is so important a physical characteristic of well made wrought iron, and has such an important bearing upon those properties which fit it for specialized service.

Typical chemical analyses and physical properties are as follows:

	Bessemer Pipe Steel.	Open Hearth Pipe Steel.	Highest Purity Open Hearth Material. (Ingot Iron.)	Genuine Wrought Iron.	
				Base Metal.	Slag.
Carbon	0.10	0.10	0.02	0.03	....
Silicon	0.05	0.05	0.01	0.01	0.14
Sulphur	0.07	0.04	0.02	0.03	....
Phosphorus	0.11	0.05	0.01	0.03	0.12
Manganese	0.37	0.35	0.03	0.01	0.02

In order to show the high purity of the base metal of wrought iron, analysis of ingot iron is cited. This is special open hearth material of highest commercial purity, and does not enter into the manufacture of merchant pipe.

It is well to bear in mind in any citation of chemical analyses of wrought iron, that it is a composite material consisting of two physically distinct constituents, slag and iron, and that the usual chemical analysis errs in giving only the total quantities of the elements found, without regard to their position in iron or slag.

The slag in wrought iron gives it a characteristic fibrous structure on fracture or by etching. The latter is illustrated in Fig. 1.

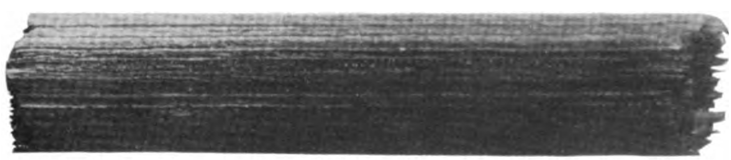


FIG. 1 — Wrought iron bar etched to develop fibrous structure.

The microstructure of wrought iron in transverse and longitudinal directions is shown in Figs. 2 and 3.

The strength and ductility of wrought iron are about 10 to 15 percent less in the transverse direction, due to the nature of the slag incorporation.

	Pipe Steel.	Wrought Iron.
Tensile strength	55,000 lb. per sq. in	48,000
Elastic Limit	30,000 lb. per sq. in	25,000
Elongation in 8″	20%	12%

The lesser strength and ductility of wrought iron in comparison with steel is sometimes contended by the adherents of steel as being a disadvantage in iron. However, we must not

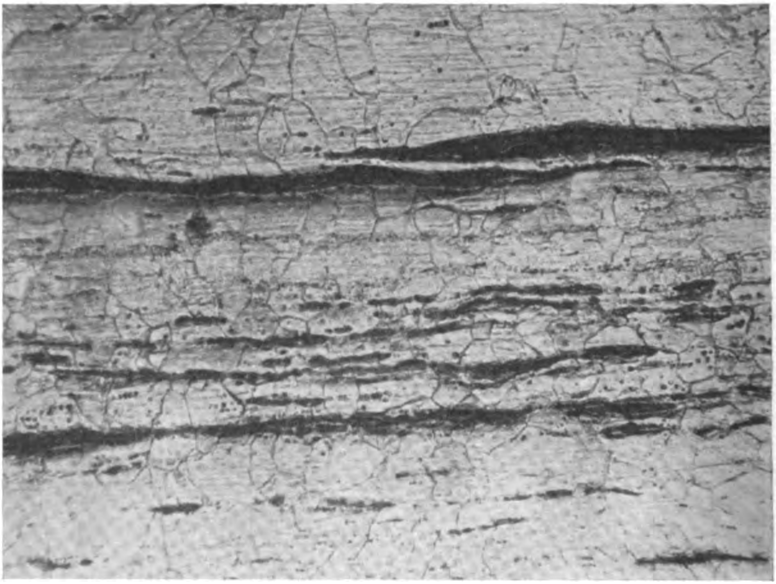


FIG. 2 — Microphotograph of longitudinal section of wrought iron. Light areas are iron; dark areas are slag.

forget that initial strength may suffer steady deterioration, due to corrosion or stresses in service, and we may sooner or later reach a point where the greater durability of the initially weaker material may enable it to give much prolonged service under strenuous conditions. Such conditions are prevalent in the use of pipes for gas service.

The manufacture of wrought iron by the puddling process

is of necessity more costly than steel making operations. Does the product have sufficient merit to warrant continuance of the practice? Wrought iron pipe has four cardinal features which stand out in comparison with the steel product.

(1) *Better Welding*—Efficiency of weld depends upon effectiveness of union of iron to iron. During heating, the edges of the skelp tend to become coated with scale, which is quite gummy at welding temperatures, and does not squeeze out

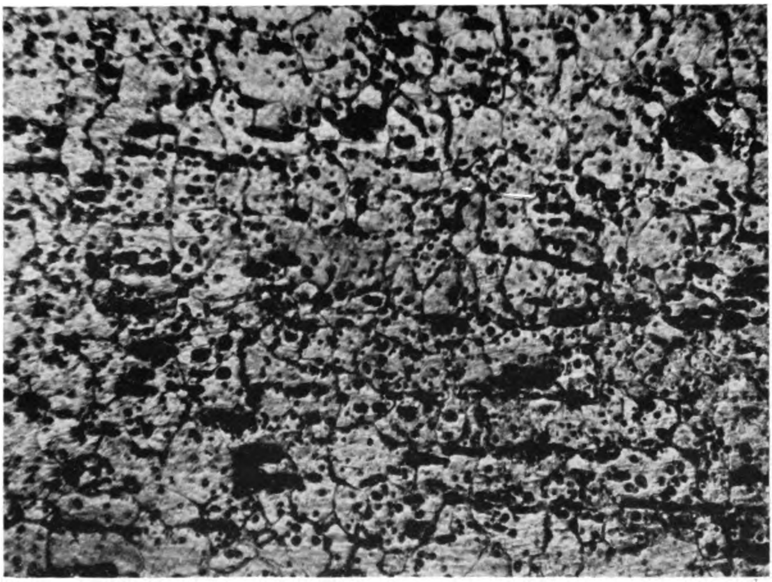


Fig. 3—Microphotograph of transverse section of wrought iron. The dark streaks are slag.

of the way. The blacksmith in welding steel uses borax as a flux, but such practice is obviously impracticable in making steel pipe. On the other hand, fluxes are not used by the blacksmith in welding wrought iron. It is self-fluxing because of the slag content. This explains why the weld in wrought iron pipe is more efficient than that in steel. Crushing tests recently made at the University of Pittsburgh showed only eight failures in the weld section in 136 pieces of lapweld wrought iron pipe of

various sizes and weights. In 128 instances, therefore, the weld was stronger than the body metal. With the increasing use of acetylene welders, the advantages of the high welding quality of wrought iron, become particularly emphasized.

(2) *Threading* — The superior threading qualities of good wrought iron is a matter of note and is due to the fibrous character of the material, which causes the chip to break or crumble, reducing friction and preventing the chip space from clogging. A clean, minutely accurate thread results, which is essential to a permanently strong, leak-proof joint. The same considerations probably account for the lesser tendency to galling of threads encountered when using wrought iron pipe. The advantages of wrought iron pipe in this respect are so well known as to need no comment, and are especially important in high pressure gas lines.

(3) *Resistance to Vibration* — Figures for tensile strength, elastic limit and elongation are no criterion of endurance under vibratory stresses or repeated shocks. It is well established that steel stressed to only a fractional part of its ultimate tensile strength will fail if subjected to sufficient repetitions of the stress. The failure is said to be due to "crystallization" or "fatigue".

The fibrous nature of wrought iron enables it to withstand these shocks and vibrations very much better than steel does, in spite of the slightly higher initial strength of the latter. Steel resembles glass in its characteristics, and any minute fracture develops with vibration, expansion, shocks and other stresses, until complete rupture occurs. A crack in a pane of glass may be arrested by boring a hole in its path to obstruct its progress. The slag in wrought iron performs a similar function by arresting the development of fissures, which would continue in steel without obstruction.

Expressed in another way, the comparison between steel and wrought iron is analogous to a solid bar as contrasted with a stranded cable. Fracture in the solid bar may continue under repeated stresses until complete failure occurs; whereas, the cable may suffer rupture of a strand without materially affecting

the cable as a whole. The strands of the cable are independent units. Wrought iron consists of a multitude of independent iron fibres by reason of the associated slag filaments.

Brake rods, brake levers, equalizers, hangers, air lines, and many other parts of locomotives and cars upon which safety of life and limb is vitally dependent, are specified of wrought iron according to standard practice upon the best railroads of the country; and wrought iron staybolts for locomotive boilers are required because they will best withstand the repeated stresses due to expansion and contraction. And this, in spite of the fact that no manufacturing difficulty prevents making steel for these purposes of vastly greater tensile strength than is possible in soft steel for pipe manufacture.

(4) *Resistance to Corrosion*—It is sufficient to state that the electrolytic theory is now generally accepted. According to this theory, all corrosion proceeds by electrolytic action caused by small electrically conducting impurities within the metal itself, or related causes.

It is well recognized that purity of the material, particularly as regards absence of sulphur and manganese, is one important factor in retarding corrosion and pitting. Why, therefore, should not Bessemer steel, most impure in this respect of all commercial steels, be particularly susceptible to attack? And why should not wrought iron, highly pure, be relatively more immune?

We are sometimes confronted with the argument that if impurities cause corrosion, why does not the large amount of slag in wrought iron cause it to corrode even more quickly than steel. The explanation is that slag, being a glassy substance, is a poor conductor of electric current and itself practically non-corrodible.

But purity is only one factor in the solution of the corrosion problem and not the solution itself. For it is well established that physical conditions, such as strains in the metal, and particularly the rust itself, play a most important role in accelerating corrosion. Such being the case, it is only possible to retard the progress of the attack by obstructions from within the metal.

Steel, no matter how pure, does not offer this resistance. Wrought iron, on the other hand, presents a myriad of slag filaments as a barrier to the progress of corrosion and pitting, the same as the graphite flakes in cast iron.

Pipe service in the gas fields requires in its various phases all or part of the qualifications which have been enumerated above. Line and distribution pipe requires good welds and good threads. Easy threading is particularly desirable when pipe has to be threaded in the field.

External corrosion, due to the weather, where the pipe is above ground, or to the attack of water and soil conditions for buried pipe, must be met.

Casing pipe should be particularly resistant to the severe corrosion which may be encountered in the water and soil conditions of the well. A weakly resistant material may soon lose its usefulness as a casing, and have no reclaim value because of this fault.

Drill pipe must withstand most severe service. Maximum strength of weld, good threads and freedom from galling, and highest possible resistance to the severe strains, are essential characteristics. Wrought iron is making tremendous strides in this field, and is proving very satisfactory under conditions where steel drill pipe caused much trouble because of crystallization and accompanying fracture.

First cost should not be the sole criterion in the selection of pipe. Unit cost of recovery and distribution is the vital consideration to the gas company. Relative length of service, therefore, assumes an importance greater than that of the initial cost. Well made wrought iron pipe of necessity costs more than steel pipe; it behooves the operator to carefully consider whether or not the qualifications which wrought iron possesses will ensure sufficiently extended service to warrant the extra initial outlay.

DISCUSSION.

President Guffey: I am sure every member of the Association joins me in thanking Mr. Aston for the very able paper he has presented this morning. In opening the discussion of this

subject, it might be well to hear first from the opposition and therefore, I am going to call on Mr. F. N. Speller, of the National Tube Company.

I now have the pleasure of introducing to you Mr. Speller.

Mr. F. N. Speller: Mr. President and Gentlemen: This paper of Mr. Aston's is certainly comprehensive and lucid in the way he has summarized all the arguments and reasons in favor of wrought iron for the manufacture of pipe. There is one omission, however, which perhaps is somewhat significant and that is he fails to cite a list of cases where wrought iron has shown unusually long life. The reason for this may be that there is an equally large number or larger number of cases where it has shown unusual short life; and the same might be said of steel pipe. The fact of the matter is that the feature of durability is now much better understood than ever before and all observers seem to agree that it is not a simple problem but a subject involving many factors and many problems and nothing is to be gained, therefore, in reciting isolated instances of unusual durability either for one material or the other.

In order to confine this discussion to a very reasonable time and to touch only on the high points of Mr. Aston's able paper, I have prepared a few notes which, with your permission, I will read.

Mr. F. N. Speller then read the following:

The material which goes into oil and gas pipe is too important to be decided by a theoretical discussion of the function of cinder in wrought iron or the different physical characteristics of wrought iron compared with steel. In drilling operations where the material is sometimes stressed beyond the elastic limit, failures are to be expected occasionally and it is under actual working conditions of this kind that steel pipe has demonstrated its superiority. That this preference is not a question of price may be seen by the fact that drillers are willing to pay the same or even a higher price for steel lines. A somewhat analogous case is the discarding of wrought iron for high pressure gas cylinders which were formerly made of welded pipe. These are now required to be made of seamless steel. The Interstate Commerce regulations also require ammonia

cylinders to be made of lapweld *steel* pipe. The large majority of high pressure oil and gas lines are of steel. The reason for this is that steel pipe will stand 40 to 50% more pressure than wrought iron pipe of the same dimensions, which means greater carrying capacity and safety. These few illustrations indicate that steel pipe is used almost exclusively where the maximum strength and high resistance is required, but as further evidence of the general trend, I quote below the production of iron and steel skelp from records of the American Iron and Steel Institute from 1905 to 1915 in gross tons:

PRODUCTION OF IRON AND STEEL SKELP IN THE UNITED STATES.

Year.	*Iron.*	*Steel.*	*Total.*	*Per cent iron.*	*Per cent steel.*
1905	452,797	983,198	1,435,995	31.5	68.5
1906	391,517	1,137,068	1,528,585	25.7	74.3
1907	444,536	1,358,091	1,802,627	24.6	75.4
1908	297,049	853,534	1,150,583	25.8	74.2
1909	370,151	1,663,230	2,033,381	18.2	81.8
1910	350,578	1,477,616	1,828,194	19.2	80.8
1911	322,397	1,658,276	1,980,673	16.3	83.7
1912	327,012	2,119,804	2,446,816	13.3	86.7
1913	312,746	2,189,218	2,501,964	12.5	87.5
1914	264,340	1,718,091	1,982,431	13.3	86.7
1915	262,198	2,037,266	2,299,464	11.4	88.6

A recent canvass of 105 gas companies in New England as to their present practice with respect to gas service lines resulted as follows:

		Per cent.
Those using steel pipe exclusively	75	71.42
Those using steel and wrought iron	13	12.38
Those using wrought iron exclusively	15	14.28
Unknown	2	

During the past twelve years the leading producer of steel pipe has increased their oil and gas pipe production nearly 100%. At the present time it is well known that the delivery of steel pipe is much worse than on wrought iron and it is possible that for this reason there is at present more wrought iron being sold for this purpose than usual.

These are the main facts which interest the practical operator. However, there are several statements in this paper which are likely to leave an erroneous impression, the most important of which I will refer to briefly. Mr. Aston states that there is lack of control in making Bessemer steel compared with Open Hearth steel. Good pipe is made by either process but so far as regularity of composition is concerned the modern Bessemer process affords almost ideal control, even more so than the Open Hearth when run in conjunction with a properly balanced plant including all departments from Blast Furnace to Finishing Mills. As illustrative of this in the manufacture of steel for lapweld pipe the yearly variations between maximum and minimum carbon contents in heats of Open Hearth steel is .05%, for Bessemer steel .02%. Wrought Iron made in small units by a large number of operators, each a law unto himself is about as irregular a metallurgical product as we have. Some of the grosser irregularities are corrected as Mr. Aston points out, by repiling and re-rolling, but the pieces are never welded together entirely and this piling increases the chances of laminations and blisters in the finished material.

Referring to the four principal advantages claimed for wrought iron:

(1) *Welding:* The claims as to better welding quality for wrought iron could be disproved by mill records, but the purchaser knows that the weld in steel pipe can be depended on and that steel pipe has in this respect special advantages and is generally used for autogeneous welding.

Steel pipe is self-fluxing. From what Mr. Aston said, he might unintentionally have given you the idea it is not necessary to have flux with steel. The distinction between pipe steel and ordinary steel is simply this, that pipe steel is made specially so as to give it that fluxing quality. That is what distinguishes it as distinct from wire steel and plate steel and other forms of steel. It has even more advantages in this respect because the fluxing quality in pipe steel is more uniform than it ever can be in wrought iron pipe and the result is that we get much larger records in the welding of steel—or pipe made of steel than made of wrought iron. I can speak from practical experience on this

subject as we were at one time the largest makers of wrought iron pipe in the country and for many years made both wrought iron and steel in the same mill. You understand, of course, each piece of pipe stands on its own merits. It has to be tested independently and has to pass individual tests so that it is very easy to collect practical data on that particular point. There is nothing that is more firmly established than the fact that steel can be made of such uniform welding quality as to be much superior in that respect to wrought iron.

(2) *Threading:* Wrought iron is said to thread easily because the chips "break or crumble". The micro sections, (Figs. 2 and 3) suggest trouble with stripped threads which is actually what experience teaches when the iron carrries an excessive amount of cinder. The samples shown appear to have nearly 20% cinder rather than 1½ per cent. as claimed. Unfortunately for our friends the cinder theory cannot be made to solve both the corrosion and the threading trouble. In this case what is sauce for the goose is *not* sauce for the gander. Shops in the field are now equipped so as to cut a clean thread on steel pipe as easily as on wrought iron; if not this can be easily remedied. There can surely be no question of the superior strength and reliability of the steel thread as the material is more homogeneous and stronger.

(3) Resistance to vibration is largely a matter of design of joint. The picture drawn by Mr. Aston of a wrought iron line continuing in service in a well with fissures extending partly through the metal is not very reassuring. The sharp root on the Briggs thread is probably responsible for many broken joints. A combined committee of the American Society of Mechanical Engineers and other engineering societies has recently recommended that the present pipe thread be flattened more like the U. S. Standard.

(4) *Corrosion:* This is a complicated subject involving many factors, all of which must be considered in trying to explain the phenomena. The Author refers to the mechanical interference of cinder in wrought iron. While in some parts of the iron this undoubtedly is a factor he fails to point out that usually the cinder is irregularly distributed and more important still, the

cinder has a strong galvanic action which sets up local currents from the iron to the cinder, resulting in accelerated corrosion. This reaction is true of all the oxides. Mr. Aston has pointed out that rust has that same action. So does magnetic oxide of which the cinder is mostly made up.

The resultant of these and many other forces will determine the relative life of the pipe and I maintain this is too complicated a problem to be solved by other than tests in actual service where both materials are put in use together under identical conditions. There are many of such tests and experiences, all indicating that there is no practical difference in the long run between wrought iron and steel in this respect. But even if there was some basis for this claim, the field lines can be easily protected in places where corrosion is anticipated, by a coating of pitch or cement concrete and made to last considerably longer at comparatively small cost. The portion subject to corrosion is usually only a small proportion of the length of the line and if this is properly protected there is no reason why the life of the line cannot be prolonged to any desired extent. (Applause).

President Guffey: We would be pleased to hear from any other member by way of discussion on this paper or on this very interesting and important topic.

Mr. S. S. Wyer: Mr. President, I would like to bring out two features as far as wrought iron pipe is concerned based on a large number of observations on a main line. It was found that as far as the corrosion was concerned where steel was used in the line, that it could, in nearly all cases be traced directly to moisture in the soil. That is, where the line was properly drained there was no corrosion. I am speaking now of the soil around the line. Where that soil was not properly drained, we invariably found corrosion. For that reason I believe that a great many line corrosion troubles would be solved if adequate provision were made to get the subsoil water away from the metal. That is, instead of merely laying the lines at any grade, when the line is laid originally make such arrangements as may be necessary to keep the line entirely free from subsoil water at all the low places. If that is done a large part of your line troubles from corrosion will be taken care of.

The second feature I want to call to your attention is that there is no distinction between wrought iron and steel as far as the rate of corrosion from electrolysis is concerned. Considerable money has been wasted by putting in high priced metal with the idea that the high priced metal would take care of the corrosion difficulties. Where you have stray currents on a line, whether that line is wrought iron or steel, the rate of corrosion will be substantially the same regardless of the fact as to whether the line is one or the other. (Applause).

PRESIDENT GUFFEY: We would be pleased to hear from any other member in any further discussion of this subject. If no other member desires to discuss it at this time, I will ask Mr. Aston, do you wish to be heard again?

MR. JAMES ASTON: Mr. President and Gentlemen: You have no doubt heard of the two men who were lined up at a bar in a western city and got into a discussion as to who wrote "Robinson Crusoe." The big fellow said it was William Shakespeare, while the little fellow said it was Sir Francis Bacon. The big fellow said this wasn't so and that he could prove it, while the little man told the big one he did not know what he was talking about, and proceeded to take off his coat to show him. After the fight had proceeded to the point where the big man had the little fellow down and was pummelling him, he put the question "Who wrote Robinson Crusoe?" "William Shakespeare," said the little man. "Sure of it?" said the other. "Dead sure," said the little one, "I saw him do it."

I suppose that is the only way Mr. Speller and I can ever settle this steel-wrought iron controversy, because it does not appear that we can get together on it through discussion on the platform.

To discuss many of the points that Mr. Speller has raised would be merely to repeat statements made in my paper. Some, again, would require lengthy or technical argument, which I have no desire to inflict upon you. But there are a few points brought out in his discussion that I should like to touch upon briefly.

First, with regard to specifying steel in certain high pressure lines. Mr. Speller's reference is solely to static stress, and

where the question of service deterioration is of secondary consideration. The instances of service and requirements are those to which steel is primarily adapted because of its high initial strength. We admit in the paper that wrought iron does not have the same initial strength.

Mr. Speller, in referring to the fact that drillers are willing to pay the same and even a higher price for steel lines, undoubtedly has in mind the so-called seamless upset steel pipe which is a specialty costing more than genuine wrought iron. It was put on the market on account of the unsatisfactory service given by ordinary welded steel pipe, on which it is a great improvement. We frankly recognize its merits over ordinary steel pipe, but do not believe it is worth as much as wrought iron. We do not believe that anyone, after trying wrought iron drill pipe, will go back to seamless upset pipe at a higher or even at the same price.

In practically all pipe service, wrought iron has strength to spare for the usual requirements; comparison of initial strength of wrought iron and steel is therefore immaterial. The feature that does enter into consideration, however, is the deterioration of one material as compared with the other in a given interval of time; since the length of service is determined by relative durability of the two materials under vibratory stresses and corrosion conditions.

As to production, we must of course admit that steel has forged ahead; and why shouldn't it? Steel is a tonnage product of general application; wrought iron is a specialty product with particular fields of utility. I do not know the figures, but there is a very large proportion of the tonnage of pipe used in which the tube feature proper, so far as the conveyance of material is concerned, does not enter into consideration. Why should you put the higher priced wrought iron into bedsteads, indoor railings, wheelbarrow handles, and the like? Again, we have a multitude of buyers who will purchase material of least cost even though they know it is not the best available for their service. Some from necessity; others from choice. We may buy a three dollar pair of shoes when a six dollar pair would be better; either because we do not have six dollars in our

pocket and we must have shoes, or because we are not convinced that the six dollar pair is any better for our use, or because somebody has told us that the three dollar pair is as good as the six dollar shoes.

Again you must not forget, gentlemen, that when the largest manufacturer of pipe in the country flops from one side of the fence to the other, it makes a hole in the wrought iron tonnage and puts the figure in the other column.

Mr. Speller states that the tonnage in oil and gas country tubular goods of the leading steel pipe producer, has gone up 100 per cent in the last few years. You may be interested in learning that the output of the leading wrought iron pipe manufacturer in pipe for oil and gas service has increased several hundred percent in this period.

As to uniformity of product, steel is made in large tonnages and it is an accepted fact that the Bessemer process allows the least latitude in control and does not effect the elimination of impurities which are found in the ore and pig iron in increasing quantities day by day. This is the reason why works making the highest grades of steel have changed from the Bessemer to the open hearth side in the past few years.

On the other hand, while wrought iron is made in small lots and by hand, and there is no analysis of the product during the process of manufacture, the iron from the puddling furnace, so far as the base metal is concerned, is practically 100 per cent pure. It is virtually impossible to get far from this purity, since the working of the process automatically controls the chemical characteristics of the base metal in well puddled wrought iron.

Mr. Speller referred to the irregular distribution of slag, and to the fact that it was not well distributed in all places. Bear in mind the extremely fine state of distribution which I stated; not more than one-five hundredth to one-thousandth part of an inch apart in both width and depth of material. It would not be well made wrought iron if the distribution became very much coarser than that, or if such distribution varied much from uniformity. Repeated tests have shown well made wrought iron to have a uniform slag distribution of the character mentioned.

One speaker states that steel pipe corrodes no more than

wrought iron in well drained dry lines. This is true. You do not have corrosion if there is no moisture; for moisture is one of the essential factors. Those of you using pipe in the gas industry realize that you have no control over this feature. You may at times be able to provide some drainage; but when you sink a casing you cannot control the character or condition of the soil you are going through, or its moisture content. You have to put up with what is there; and in such event you had better choose the material which is best adapted to withstand that which is there.

When the electrolytic theory of corrosion is spoken of, or corrosion due to electrolytic action, do not get this confused in your minds with electrolysis due to stray currents. So far as resistance to external electrolysis is concerned, it is doubtful whether wrought iron is better than steel, since stray currents from street railways, etc., are induced by forces foreign to the pipe line, and when a given current leaves the pipe, it must carry into solution its quantitative equivalent in iron, whether this comes from steel or iron pipe. When we speak of corrosion going on according to the electrolytic theory, however, we refer to forces set up by the metal itself. The more impure the substance is, the greater is the electrolytic action which comes into play. In addition to greater purity, wrought iron possesses an advantage over steel by reason of the fact that we have within it the slag barriers which retard the progress of corrosion as the other causes come into play. (Applause.)

PRESIDENT GUFFEY: Any further discussion of this paper? Gentlemen, we make now completed the list of papers provided for this meeting and we will now proceed with the reports of committees.

The first committee I will call upon for report is the Joint National Committee on Electrolysis. Mr. Forrest M. Towl is Chairman, and Samuel S. Wyer and Bert C. Oliphant are members.

MR. BERT C. OLIPHANT: Gentlemen: Mr. Wyer should really read this report as he had done practically all the work but he is so modest that he asked me to read it for him.

Mr. Bert C. Oliphant then presented the following:

REPORT OF JOINT NATIONAL COMMITTEE ON ELECTROLYSIS.

The Natural Gas Association of America:

Your Committee appointed to represent the Association in the Joint National Committe on Electrolysis reports the following as a summary for the year's work:

The results of the Committee's work have been embodied in a bound printed report which may be obtained for $1.00 from the Secretary of the American Institute of Electrical Engineers, 29 West 39th Street, New York City. A copy of this report has been filed with the Resident Secretary at Permanent Headquarters and a copy sent to the President and the Secretary.

The general committee has appointed a sub-committee on which this Association has a representative to prepare an additional report covering specific electrolysis remedial measures. This sub-committee expects to make considerable progress on this additional report this year.

Respectfully submitted,

SAMUEL S. WYER,
BERT C. OLIPHANT,
FORREST M. TOWL, *Chairman.*

PRESIDENT GUFFEY: What is the wish of the Association with reference to this report? Every member of the Association who is interested in this problem should secure a copy of the report of this joint committee. It is very interesting and very instructive.

MR. KAY C. KRICK: I move that the report be received, placed on file and spread upon the minutes and that the Committee be continued for another year.

MR. J. H. MAXON: I second the motion.

The above motion having been duly seconded was then unanimously adopted.

PRESIDENT GUFFEY: The next report is the report of the Committee on "Rates" of which Judge S. M. Douglas, of Mansfield, Ohio, is Chairman. The other members of that Commit-

tee are Alfred Hurlburt, of Kansas City, Missouri, and Donald McDonald, of Louisville, Kentucky. I take pleasure in presenting Judge Douglas, gentlemen.

HON. S. M. DOUGLAS: Mr. President and Gentlemen: I dislike to be on a committee, especially as its chairman, when all the report we have to offer is that we are simply, — not "beating time" but making progress. To go back to last year, we presented a report at the last meeting, the central idea of which was to eliminate the unprofitable consumer. We recommended a scale of rates which was adopted by the Association. The new things that have loomed up on the horizon of the Natural Gas Association were largely developed in that very excellent paper that we discussed yesterday afternoon on the question of mixing gases and for that reason I say that about all your committee can do at this time is to simply report that the Committee is making progress, but we have no definite report to present.

PRESIDENT GUFFEY: The Chair will entertain a motion that the Committee be continued if that is the wish of the Association.

MR. J. C. MCDOWELL: Mr. President, I move that the verbal report by the Chairman of the Committee be received and that the Committee be continued for another year.

MR. A. J. DIESCHER: I second the motion.

The above motion, having been duly seconded, was then unanimously adopted.

PRESIDENT GUFFEY: The next report, gentlemen, is the report of the Committee on Ways and Means. Mr. John M. Garard is Chairman, and the other members of the Committee are Martin B. Daly and John E. Gill.

MR. JOHN M. GARARD: Mr. President and Members of the Association: The object of this committee was to present Ways and Means of securing funds to take care of our financial affairs. We have thought of a great many ways to do this. Finally we decided that the way suggested in our report was really the best method the Committee could devise.

Mr. John M. Garard, as Chairman, then read the following:

REPORT OF COMMITTEE ON WAYS AND MEANS.

BUFFALO, NEW YORK, May 17th, 1917.

To the Officers and Members of the Natural Gas Association of America.

GENTLEMEN: Your Committee on Ways and Means, after a canvass of the different interests engaged in the business, including production, transportation and distribution, recommends that all companies be listed as members of this Association upon payment of the following named fees:—$25.00 per annum as membership fee.

In addition to the above one-fiftieth of 1% tax on the gross revenue of each company for the support of the headquarters of the Association. It is the intent of the Committee making this recommendation, that the tax shall apply to the net gross receipts, that is, where one company is producing and selling to a distributing company, that the purchase price of the gas shall be deducted from the gross receipts and the tax paid on the balance.

Respectfully submitted,

J. M. GARARD,
M. B. DALY,
Committee.

MR. JOHN M. GARARD: You will note from the language of this report that the $25.00 per annum as membership fee refers to the little companies as well as to the big companies. It matters not what your assessment might be, but this is more in the way of a ready-to-serve change. (Laughter.) We thought that that would not injure the little fellow and we know it will not hurt the big fellows. You will note also that the report is signed by only two members of the Committee. Mr. Gill is not here, but he said he would concur in the report.

PRESIDENT GUFFEY: Gentlemen, you have heard the report of this committee on Ways and Means. For the future of the Association I can merely say it is the most important report we have had at this meeting. We have plans outlined which re-

quire, as I said in my original address, at least $25,000 to maintain the permanent headquarters in the manner they should be maintained and to render the service we want to render to all companies and all members of the Association. If that plan is put into effect it will raise a little more than the $25,000 just mentioned. If every company joins in participating in membership, Mr. Garard informs me it will raise about $28,000.00. I sincerely hope the Association will adopt the report and approve that method of membership. I believe we need it and it will do the Association a lot of good. We have some rather far-reaching plans for the future by which we will be able to render a good deal more service to the companies and members than we have in the past. What is the wish of the Association with reference to the report?

MR. KAY C. KRICK: I move the adoption of the report.

The above motion, having been duly seconded, was then unanimously adopted.

PRESIDENT GUFFEY: The next report is the report of the Committee on Memorials. Mr. Milt Saul is Chairman and Mr. R. W. Gallagher and Mr. C. W. Sears are members.

MR. MILT SAUL then read the following:

REPORT OF COMMITTEE ON MEMORIALS.

To the Members of the Natural Gas Association of America:

GENTLEMEN: The solemn hour has arrived when we pause to reflect on the loss this Association has sustained during the past year through the Hand of Death. We see a list of departed brothers that is at once startling in proportion and yet distinguished for the names it contains. We mourn our loss yet, in contemplating the names of those who have Crossed the Bar since we met last year we cannot help but feel that each name represents a full measure of this life's activities and a life work that is well done.

It is the recommendation of your Committee that a page in the minutes of these proceedings be set aside to permanently record this Association's sincere sorrow at the loss sustained in the deaths of

T. N. BARNSDALL,	W. J. REILLY,
F. B. ENSLOW,	G. X. WITTMER,
H. J. HOYT,	LOUIS B. FULTON.

And that the expression of this sentiment be forwarded by our Secretary in appropriate form to the families of our departed associates.

MILT SAUL,
R. W. GALLAGHER,
C. W. SEARS,
Committee.

PRESIDENT GUFFEY: You have heard the report of the Committee on Memorials. What is the desire of the Convention?

MR. J. C. McDOWELL: I move, Mr. President, that the report be adopted by a rising vote.

MR. A. J. DIESCHER: I second the motion.

And thereupon the above motion, having been duly seconded, was unanimously adopted by a rising vote.

President Guffey: The Secretary will see to it that the request contained in the report be carried out with reference to forwarding to the families of our departed associates an expression of our sincere sorrow at the loss sustained by the death of the members referred to in the report.

The next committee to hear from is the Committee on President's Address, consisting of Martin B. Daly, J. W. McMahon, and O. K. Shannon.

Mr. Martin B. Daly then presented the following:

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Buffalo, New York, May 17th, 1917.

To the Members of the Natural Gas Association of America:

Gentlemen: The address of President Joseph F. Guffey, evidences careful, conservative thought along constructive lines and the recommendations made should receive thoughtful consideration by the Natural Gas Industry generally. We suggest that special attention be given to the President's words on conservation and the elimination of all waste by companies having public obligations and the exercise of the influence of this Association and its members on the producer, seller and user, who have none of the obligations assumed by the utility engaged in serving the people, so that the concerted action recommended may become a reality, not only locally but nationally. Special attention is called to the reference made to the duty of this organization in sustaining national honor, and to this end your committee especially calls to the attention of the members that the National Defense Board, constituted of the ablest minds of the country, has honored the Natural Gas Association by appointing one of its members to take an active part. We suggest that the individual and united effort be concentrated in bringing to the Defense Board through the member of this Association all information that may contribute to the success of his work and will enable him to serve our country best.

Your Committee unanimously recommends that the address

of the President be received, approved and spread upon the records.

Respectfully submitted,

M. B. Daly,
James W. McMahon,
O. K. Shannon,
Committee.

Mr. T. C. Jones: Gentlemen, you have heard the report of the Committee on President's Address. What is your pleasure?

Mr. John M. Garard: I move that the report of the Committee be adopted and placed upon the records.

Mr. J. C. McDowell: I second the motion.

The above motion, having been duly seconded, was then unanimously adopted.

President Guffey: Your Chairman yesterday was authorized to appoint a committee of five to represent the Natural Gas Association of America and to work under the direction of and in harmony with the sub-committee of the National Council of Defense of which Mr. A. C. Bedford is Chairman. I will now state that I desire a little while longer to consider the personnel of that committee. I will attend to it, however, in a few days after consultation with some of the more active members of the Association.

The next report is the report of the Committee on the time and place of next meeting. Mr. Kay C. Krick is Chairman and Mr. William B. Way and O. K. Shannon are members.

Mr. W. B. Way then submitted the following:

REPORT OF COMMITTEE ON TIME AND PLACE OF NEXT MEETING.

Your Committee on Time and Place of Next Meeting recommends that the meeting be held Tuesday, Wednesday, and Thursday of the third week in May, 1918, but believe it would be inadvisable to select the place of meeting now and recommend that this be decided upon by the Board of Directors of the Natural Gas Association at a later date, such date to be determined by them.

Your Committee would also recommend that provided suitable exhibit hall, meeting room and hotel accommodations be assured, that your Board of Directors look with favor upon the application of Louisville, Kentucky.

Wm. B. Way,
O. K. Shannon,
K. C. Krick.

Mr. Wm. B. Way: Mr. Shannon asked me to add to this report that he has signed, the fact that he is in favor of selecting Louisville, Kentucky, now as the place of next meeting.

Mr. Maurice W. Walsh, of the Louisville Gas & Electric Company, Louisville, Kentucky, then said:

Mr. President, before any action is taken upon this report I would like to read a few telegrams welcoming the Association to Louisville, Kentucky, next year.

Being a charter member of this Association, having attended every convention held by the Association, having had the pleasure of entertaining you gentlemen at one time at Oklahoma City, being familiar with the needs in entertaining the members of the Association, I desire to present to you briefly the advantages of Louisville, Kentucky, in that regard. I call to mind the first meeting that was had in the organization of this Association. The organization of this association was taken up in the town of Ottawa, Kansas, by three members, one of whom I believe has dropped out since, those three members being Mr. Becker, Mr. Sears and myself. The suggestion was made to Mr. Sears on account of his affiliation with the Kansas Natural and visiting different points in that locality that he speak to the gas men in particular in regard to forming such an Association. He did that in his travels and a meeting was called at the Midland Hotel which was attended by 13 gas men. Some of the members being superstitious in regard to the figure 13, a stranger was admitted and invited to partake of the dinner which was held there that day and at that meeting it was recommended that a meeting be called in the near future for the purpose of securing a charter and forming the Natural Gas Association of America. This was done a few months later at the Hotel Midland. The

preliminary call was signed by 25 members and since this time this Association has grown to the enormous membership which we have at the present time. I remember at that time the meeting of the supply men in displaying their goods was held in a store room approximately 60 feet in length by 20 feet in width. The gas men installed gas in there for the purpose of the better exhibiting their articles they had on display and after opening it up the room became so hot we all had to leave.

At another time at Joplin, Missouri, our entertainment consisted of an open air theatre, a block away from the hotel.

Being in a position to know, and knowing what this Association needs in the way of convention halls, banquet rooms and exhibit halls for the supply men, I am here to inform you that we have at Louisville an Armory 260 feet by 270 feet which includes another large armory upstairs suitable for a meeting place. The armory is situated within a block of the two leading hotels of the city and in the heart of the city. Accommodations at the hotels I am assured by the Hotel Men's Association, will be ample to take care of all the needs of its members. I am assured that the armory will be at your disposal and that we will have all the accommodations necessary to take care of the large number of new members that will probably be in with us by this time next year.

I wish to read to you a few telegrams. First, I will read the telegrams from Honorable John H. Buschemyer, Mayor of the City of Louisville:

"Louisville desires honor of entertaining Natural Gas Association of America in next convention and I cordially and sincerely unite in invitation extended by our commercial organization."

I next desire to read a telegram from the Board of Trade of the City of Louisville by William E. Morrow, its Secretary, which is as follows:

"Board of Trade earnestly urges acceptance of invitation from convention league to Natural Gas Association to hold next meeting in Louisville."

I next desire to read telegram from Louisville Convention and Publicity by C. C. Ousley, its secretary, as follows:

"Commercial and Civic Organizations of Louisville unite in cordial invitation to Natural Gas Association of America to meet here next year. We will provide armory as exhibit hall with uninterrupted floor space 240 by 270 feet; will furnish hotel, convention hall seating eight hundred and hotel banquet hall seating 500, all within block and half of armory. Our hotel accommodations are adequate for largest conventions. Please inform delegates that the metropolis of the state famed for hospitality sincerely bids them come."

I have another telegram from Otto Seelbach, President of the Louisville Hotel Association as follows:

"Am elated at your prospect of landing convention in Louisville next year. Telegram of invitation from Convention League endorsed by all commercial organizations on the way. Our Hotel Association will do all in their power to make the convention a success and you can depend on our cooperation. The Seelbach seats eight hundred for conventions, or five hundred for banquet."

Now gentlemen, I do hope before you adopt this report that you will vote unanimously to hold your next meeting next year in Louisville, Kentucky. We have all the accommodations necessary to take care of you. If I were not positive of this I would not come before you and ask your indulgence in this matter. I am certainly personally able to speak from experience as I have attended all of your previous meetings and I know that the accommodations for the Association as to meeting place, banquet hall and exhibit hall, together with hotel accommodations, will be ample and that if you so decide you will be cordially received and properly taken care of, and after experiencing the hospitality which we are ready to give you, you will be proud of your visit to Louisville. I thank you. (Great applause.)

PRESIDENT GUFFEY: Any further discussion with reference to the report of the Committee? What is the wish of the convention with regard to the report of the committee? The committee recommends briefly that the third week of May, 1918, be the time for the holding of our next annual meeting and the report also recommends providing a suitable exhibit hall, meeting

room and hotel accommodations be assured, your board of directors look with favor upon the application of Louisville, Kentucky. The Committee, however, report that it believes it would be inadvisable to select a place of meeting now and recommends that this be decided upon by the Board of Directors at a later date.

MR. MAURICE W. WALSH: Mr. President, I desire to make a motion that this convention decide at this time to meet next year in the city of Louisville and hold its next annual meeting there.

MR. O. K. SHANNON: I second that motion.

MR. JOHN M. GARARD: Mr. President, I am heartily in favor of Louisville and would be glad to go but I am not right sure that it is the proper thing to accept an invitation from any city at this time. I am sure that Mr. Walsh knows what he is talking about in regard to accommodations. That part of it is not in question. But gentlemen, we are in war. He speaks of the Armory at Louisville. The armory may be occupied by other people at that time. I was about to move the adoption of the report but I am reminded that there is a motion already before the house. I think it would be very much better to leave this to our honorable Board of Directors for future action. I do not believe we should decide it today.

MR. WILLIAM B. WAY: Mr. President, I asked for the floor immediately upon the reading of the report for the purpose of making a request but the Chair did not see me and recognized Mr. Walsh. May I make that request still?

PRESIDENT GUFFEY: Yes; you may make it.

MR. WILLIAM B. WAY: May I make a motion that will supersede Mr. Walsh's motion?

PRESIDENT GUFFEY: That will be out of order. We will have to vote on the question before the house.

MR. MARTIN B. DALY: Mr. President, I am not one of the officers of the Association and therefore will not probably be annoyed by a report of this kind, but it seems to me that the Committee has shifted the responsibility in making an indefinite report. I say that without any intent to criticise the Committee. If this report is adopted as it has been presented, the directors

of the Association and the other officers of this organization will probably be flooded with communications for the next three or four months asking them to send delegations to various places and to investigate whether each particular place would be the proper and only place for our next meeting. The Directors have the power to revoke any acceptance at this time or at any other time throughout the year if they find it is not consistent or convenient to accept. We are going to hold a convention next year. It may not be convenient and it may not be the proper thing for the supply men to make an exhibit because there may be difficulties in the way which do not exist at this time but the Natural Gas Association of America should by all means hold a meeting next year and the time to decide the place of that meeting, it seems to me, is here and now. (Great applause.) If we decide later that Louisville is not the place, the Board of Directors can revoke the acceptance and decide on some other place. I am sure that Mr. Walsh, representating as he does the gas interests of Louisville, will be glad to join with us if any such difficulty should arise in selecting a more proper or more convenient location for our next meeting. It seems to be about the only available place. Down there the armory is not occupied, as I understand it, during that season of the year. If there are any soldiers they are out in tents due to the climatic conditions existing in Kentucky. It seems to me this is about the only invitation before this convention that could be accepted. I know as to other places there is a degree of uncertainty as to whether the convention could be taken care of if it was decided to go there. I am in favor of accepting Louisville. (Great applause.)

President Guffey: Any other remarks?

Mr. John M. Garard: Mr. President, just to show you how quickly I can flop, I am heartily in accord with what Mr. Daly has said. (Great laughter and prolonged applause.)

President Guffey: You also believe in passing the "buck" to the Board of Directors. (Renewed laughter.)

Mr. Krick, do you want to be heard as Chairman of the Committee?

Mr. Kay C. Krick: Mr. President and Members: Of

course the committee in presenting their report, has done so from a precautionary standpoint and the difficulties the committee had in mind have been largely covered by what Mr. Garard referred to. The Committee were all heartily in favor of Louisville and the Committee are also heartily in favor of a meeting next year. We felt, however, that it might be wise to leave the question open for further consideration. I am very glad to see, though, the matter taken up by the membership here. I would much prefer to have you decide it by your votes rather than to seek to have the action of the committee made final. I cheerfully join with Mr. Garard and Mr. Daly and the others in asking that you give Louisville consideration now and here, and decide it as you deem best. (Great applause.)

Mr. J. C. McDowell: Mr. President, I am ordinarily disposed to stand by the report of a committee that is appointed to consider a matter but I do hope in this instance that this committee will reconsider and recommend Louisville right now.

Mr. William B. Way: Mr. President, our real object in making the report we did was as stated by Mr. Krick. We were all in favor of Louisville, and we were all in favor of holding a meeting, but this is a big affair. It takes a lot of work. It takes a lot of time which we supply men gladly give you. We want to do everything we can to entertain you and make each meeting of this Association better than the preceding meeting. We will go anywhere you want to go. If you want to go to—— well, even if you wanted to go to Columbus, we would go with you. (Great laughter.)

Mr. John M. Garard of Columbus: Better wait until you are invited. (Renewed laughter and applause).

Mr. William B. Way: But for a workman to do good work he must have good tools and we thought possibly we would get a chance between the time this report is made and the time when it would be necessary to fix the place of next meeting, to go down there and look over the situation to see what we had to work with ourselves. Not that it makes any difference to us a whole lot but it might have made a difference. Then also, the idea occurred to us that all the armories and all the

large buildings might, at that time, be taken up by troops and provisions and artillery and such equipment as go to make up the well equipped and well provisioned army that is going to lead us on to victory. We brought that matter to Mr. Walsh's attention and he told us it was warm down there in May and the troops would be out of the armory. Well, it may be warm in May but we felt that the citizens of Louisville might possibly need all available space for store houses. That, of course, entered into it. Therefore, we think it would be good policy to defer it for a while. We want the meeting. We know it is good policy to have the meeting. We would not want to go on record as favoring anything else. We know it is bad policy to do anything but follow along President Wilson's idea, when he suggested that we all go along with our businesses, following out normal lines as far as possible. That is the course that we want to follow, but if this Association now wants to go to Louisville next year for its next place of meeting, I am with you. (Great applause).

President Guffey: Any further discussion? As I understand the motion before the house is to amend the report of the Committee as to the place of our next meeting changing it from a recommendation in favor of Louisville so as to read that the place of our next meeting will be Louisville, Kentucky. That motion has been seconded. Are you ready for the question? All those in favor of meeting next year in the third week in May, 1918, at Louisville, Kentucky, will say "Aye".

Voices: "Aye".

President Guffey; Opposed "No."

Voices: "No".

President Guffey: The "Ayes" seem to have it. The "Ayes" do have it and it is so ordered. (More applause).

We will now hear the report of the Nominating Committee. consisting of John M. Garard, Chairman; A. A. Armstrong and Bert C. Oliphant are the other members of the Committee.

Mr. John M. Garard then submitted the following verbal report:

REPORT OF COMMITTEE ON NOMINATIONS.

Mr. President, and Members of the Natural Gas Association of America:

If I may, I would like to supplement the announcement of the various members we have selected for various offices with this statement. As you all know, Mr. Braden, of Tulsa, Oklahoma, was selected last year as the Vice-President. I want to say, however, that he told me personally he accepted it with the understanding that the meeting went the following year to Tulsa. He said if it did not go there he did not want the Vice-Presidency. He also said that Tulsa could not take care of the Convention; that the hotels were so full even with the present traveling public that it would be out of the question for them to offer any accommodations at all to the members of this Association. Mr. Braden came before this Committee yesterday and said that on account of the Association not going west next year — which he knew it could not do — he withdrew as Vice-President of the Association. In view of this fact, as there was no Vice-President and as our present President has had the matters in hand and as this is going to be one of the most important years in the history of the gas industry and especially of this Association, we felt that it might not be good policy to trade officers just as this time.

With that preliminary statement, I desire to submit to you the names of the following members of this Association to be placed in nomination for the various offices that are to be filled:

For President: Joseph F. Guffey, of Pittsburgh, Pennsylvania. (Applause).

For Vice-President: Kay C. Krick, of Columbus, Ohio. (Applause).

And I want to say to you right here that we have no apologies to offer on account of him being a Columbus man. (Laughter and applause).

For Secretary and Treasurer: Thomas C. Jones, of Delaware, Ohio.

For Resident-Secretary: David Oliver Holbrook, of Pitts-

burgh, Pennsylvania; that is the only man I do not like to mention. (Renewed laughter and applause).

For Directors: Andrew A. Armstrong, Pittsburgh, Pennsylvania; James W. McMahon, Toledo, Ohio; Clifton W. Sears, of Mansfield, Ohio; John H. Maxon, Muncie, Indiana; Harry J. Hoover, Cincinnati, Ohio; Glenn T. Braden, Tulsa, Oklahoma. (Applause).

For Editor Wrinkle Department: W. Re. Brown, Columbus, Ohio.

For Assistant Editor, Wrinkle Department: Alfred J. Diescher, Bartlesville, Oklahoma.

Respectfully submitted,

J. M. Garard,
B. C. Oliphant,
A. A. Armstrong,
Committee.

I thank you very much, gentlemen. I do not know whether your applause is an indication that we have done it well or whether it is for the members we have placed in nomination. (Renewed laughter and applause).

President Guffey: Are there any other nominations to be presented before the Convention?

Mr. Martin B. Daly: Mr. President, I would like to make one suggestion. I think the original title given the so-called Resident Secretary, was that of Commercial Secretary. It seemse to me that is a more appropriate title than Resident Secretary. Resident Secretary does not mean anything to my mind.

John M. Garard: I would be very glad to make that change on the record. I thank you very much, Mr. Daly.

President Guffey: Note that change. What is the wish of the Convention as to the nominations? Are there any further nominations?

Mr. Milt Saul: Mr. President, I move that the nominations be closed.

Mr. J. C. McDowell: I second the motion.

The above motion, having been duly seconded, was then unanimously adopted.

ELECTION OF OFFICERS.

Mr. Henry S. Norris: Mr. President, I move that the report of the Committee on Nominations, as amended, be adopted and that the Secretary be authorized and directed to cast a ballot of all the members present for the election to office of the members nominated for the respective positions as indicated by the report of the Committee.

Mr. J. C. McDowell: I second the motion.

The above motion, having been duly seconded, was then unanimously adopted.

Mr. T. C. Jones: Gentlemen: Complying with the motion just adopted, it gives me a great deal of pleasure to cast the ballot of each member of the Association for the election of the nominees to the various offices as referred to in the report of the Committee on Nominations. I do now cast the ballot accordingly. (Applause.)

President Guffey: Gentlemen, I have a very important telegram I would like to read to you. Before reading it, however, I want to thank each and every member of this Association for the honor conferred upon me and I can only assure you that I will do all in my power to make the meeting next year the most successful of the many successful meetings held by your Association. (Applause.)

You will recall that yesterday afternoon a committee consisting of L. B. Denning, S. J. Lockwood tnd George W. Crawford was appointed to draft resolutions pledging our support and co-operation to the President of the United States in the present international crisis and instructing your President to communicate the action of this Association to the President of the United States. Complying with the terms of that resolution, the following telegram was forwarded under the seal of your President:

"BUFFALO N. Y., May 16, 1917.

"His Excellency,

"WOODROW WILSON,

"President of the United States of America, Washington, D. C.

"At a meeting of the members of the Natural Gas Association of America in Convention at Buffalo, N. Y., it was unanimously resolved, amid great enthusiasm, after hearing the patriotic address of Mr. A. C. Bedford, Chairman of the Committee on Petroleum, of the National Council of Defense, on 'Mobilizing Industry for War.'

"That the Natural Gas Association of America, representing the Natural Gas Industry of the United States of America, unreservedly stands by the President in the present war crisis and pledges the co-operation and support of all its members to the Government to secure a successful termination of the war of democracy against autocracy, and that the President of this Association, Mr. Joseph F. Guffey, be instructed to communicate the action of this Association to the President of the United States. 'JOSEPH F. GUFFEY, *President Natural Gas Association of America."*

This morning I received the following reply:

"THE WHITE HOUSE, WASHINGTON, D. C., May 17.

"HON. JOSEPH F. GUFFEY,

"President Natural Gas Association of America,

"Buffalo, N. Y.

"The President deeply appreciates the patriotic assurances which you give him in the name of The Natural Gas Association of America. He sends to you and to the Convention his warmest thanks.

"JOSEPH P. TUMULTY,

"Private Secretary."

(Great applause.)

Is there any further business to come before the meeting?

MR. KAY C. KRICK: Mr. President, we were all very much impressed yesterday by that marvelous address from Mr. Bedford. It has been the general wish expressed by a number of the members that it could be reproduced by this Association in such numbers that the members of the Association could procure additional copies of it for the purpose of distributing it. Mr. Robinson, of the West Virginia Association, desires, as I understand, 3,000 copies for the membership of his Association. I would like to make a motion before we adjourn that the Secretary be instructed to print say, 10,000 copies of that address for distribution for those who desire to distribute it.

PRESIDENT GUFFEY: I would suggest 10,000 copies or more, if necessary.

MR. KAY C. KRICK: Yes, or more if necessary.

MR. MARTIN B. DALY: I second the motion.

PRESIDENT GUFFEY: The motion is to authorize the Secretary to print 10,000 or more copies of the address as made by Mr. A. C. Bedford yesterday. Are there any remarks?

MR. EDWIN ROBINSON, Secretary-Treasurer, West Virginia Natural Gas Association, Fairmont, West Virginia: Mr. President, I would like to secure 3,000 copies for the Natural Gas Association of West Virginia and I would like to inquire whether that number is included in the 10,000 copies?

PRESIDENT GUFFEY: Mr. Robinson, that is why I added the words "Or more if necessary."

MR. EDWIN ROBINSON: If that is the intention, then that is all I desire to know.

PRESIDENT GUFFEY: The motion before the house is a motion duly seconded for the Association to publish 10,000 or more copies of the address of Mr. A. C. Bedford, on the Mobilization of Industry for War, for distribution among the members of this Association and among the members of the various gas organizations or companies desiring such copies for distribution. Are you ready for the question?

VOICES: Question.

The above motion having been duly seconded, was then unanimously adopted.

PRESIDENT GUFFEY: Is there any further business to come before the meeting? I want to make this announcement. At the beginning of the year we had an enrolled membership of 1176; released from membership during the year, 142; new members, 262; making the total membership at this time 1296 (great applause).

If there is no further business to come before the Association at this time, I will now entertain a motion to adjourn *sine die*.

And thereupon, upon motion duly seconded and carried, the Twelfth Annual Meeting of The Natural Gas Association of America, adjourned *sine die*.

APPENDIX

OFFICERS

OF THE

NATURAL GAS ASSOCIATION OF AMERICA 1917-1918

PRESIDENT.

JOSEPH F. GUFFEY....................Pittsburgh, Pennsylvania

VICE PRESIDENT.

KAY C. KRICK...............................Columbus, Ohio

VICE PRESIDENT.

DAVID O. HOLBROOK.................Pittsburgh, Pennsylvania

SECRETARY AND TREASURER.

THOMAS C. JONES...........................Delaware, Ohio

DIRECTORS.

BERT C. OLIPHANT, Buffalo, N. Y........	Term Expires 1918
ALFRED HURLBURT, Kansas City, Mo......	Term Expires 1918
ARTHUR BOOTH, Pittsburgh, Pa..........	Term Expires 1918
OGDEN K. SHANNON, Fort Worth, Texas..	Term Expires 1918
FRED P. GROSSCUP, Charleston, West Va...	Term Expires 1918
JAMES C. DUFFIELD, London, Ontario.....	Term Expires 1918
ANDREW A. ARMSTRONG, Pittsburgh, Pa...	Term Expires 1919
JAMES W. MCMAHON, Toledo, Ohio......	Term Expires 1919
CLIFTON W. SEARS, Wooster, Ohio........	Term Expires 1919
JOHN H. MAXON, Muncie, Indiana........	Term Expires 1919
HARRY J. HOOVER, Cincinnati, Ohio.......	Term Expires 1919
GLENN T. BRADEN, Tulsa, Oklahoma......	Term Expires 1919

PAST PRESIDENTS.

*Kerr M. Mitchell	1906-1907
Jesse C. McDowell	1908-1909
William H. McKenzie	1910
John M. Garard	1911
Alexander B. Macbeth	1912
Martin B. Daly	1913
Ernest L. Brundrett	1914
James T. Lynn	1915
William Y. Cartwright	1916
Joseph F. Guffey	1917

PAST SECRETARIES.

Joseph H. Dunkel	1906-1908
James F. Owens, (Elected for)	1909

PAST ANNUAL MEETINGS.

Organization, Kansas City, Mo., Feb'y. 20, Feb'y. 27 and March 20, 1906.

First	Kansas City, Mo., June 12 and 13, 1906
Second	Joplin, Mo., May 21, 22 and 23, 1907
Third	Kansas City, Mo., May 19, 20 and 21, 1908
Fourth	Columbus, Ohio, May 18, 19 and 20, 1909
Fifth	Oklahoma City, Okla., May 17, 18 and 19, 1910
Sixth	Pittsburgh, Pa., May 16, 17 and 18, 1911
Seventh	Kansas City, Mo., May 21, 22 and 23, 1912
Eighth	Cleveland, Ohio, May 20, 21 and 22, 1913
Ninth	Saint Louis, Mo., May 19, 20 and 21, 1914
Tenth	Cincinnati, Ohio, May 18, 19 and 20, 1915
Eleventh	Pittsburgh, Pa., May 16, 17 and 18, 1916
Twelfth	Buffalo, N. Y., May 15, 16 and 17, 1917

WRINKLE DEPARTMENT.

W. Re. Brown, *Editor*	Columbus, Ohio
Alfred J. Diescher, *Assistant Editor*	Bartlesville, Oklahoma

* Deceased.

COMMITTEES, 1917-1918.

ADVISORY.

WILLIAM Y. CARTWRIGHT, *Chairman*	Cincinnati, Ohio
JESSE C. MCDOWELL	Pittsburgh, Pennsylvania
WILLIAM H. MCKENZIE	Kansas City, Kansas
JOHN M. GARARD	Columbus, Ohio
ALEXANDER B. MACBETH	Los Angeles, California
MARTIN B. DALY	Cleveland, Ohio
ERNEST L. BRUNDRETT	Kansas City, Missouri
JAMES T. LYNN	Detroit, Michigan

UNIFORM ACCOUNTING.

H. C. REESER, *Chairman*	Pittsburgh, Pennsylvania
V. A. HAYS	Independence, Kansas
H. V. SHULTERS	Cleveland, Ohio
R. H. BARTLETT	Pittsburgh, Pennsylvania
W. R. HADLEY	Pittsburgh, Pennsylvania
C. W. DOWNING	Cleveland, Ohio
G. W. RATCLIFFE	Pittsburgh, Pennsylvania
W. J. JUDGE	New York, New York
J. B. TONKIN	Pittsburgh, Pennsylvania
C. S. MITCHELL	Pittsburgh, Pennsylvania
T. F. WICKHAM	Cincinnati, Ohio
G. C. SCOTT	Columbus, Ohio
L. A. SEYFFERT	Charleston, West Virginia

CONSERVATION.

ALFRED J. DIESCHER, *Chairman*	Bartlesville, Oklahoma
ISRAEL C. WHITE	Morgantown, West Virginia
ERNEST L. BRUNDRETT	Kansas City, Missouri
WILLIAM T. GRISWOLD	Pittsburgh, Pennsylvania
FORREST M. TOWL	New York, New York

NEW MEMBERS.

MAURICE W. WALSH, *Chairman*.	Louisville, Kentucky
JOHN R. MUNCE..............	Little Rock, Arkansas
FRANK P. FISHER............	Bartlesville, Oklahoma
GEORGE S. SHINNOCK.........	Columbus, Ohio
RALPH W. HAY..............	Pittsburgh, Pennsylvania

SUB-COMMITTEE ON NATIONAL DEFENSE.

JOSEPH F. GUFFEY, *Chairman*..	Pittsburgh, Pennsylvania
JOHN G. PEW, *Vice Chairman*..	Pittsburgh, Pennsylvania
GEORGE W. CRAWFORD.........	Pittsburgh, Pennsylvania
GLENN T. BRADEN............	Tulsa, Oklahoma
JESSE C. McDOWELL...........	Pittsburgh, Pennsylvania
WILLIAM Y. CARTWRIGHT......	Cincinnati, Ohio

FINANCE.

KAY C. KRICK, *Chairman*......	Columbus, Ohio
ANDREW A. ARMSTRONG.......	Pittsburgh, Pennsylvania
JOHN H. MAXON.............	Muncie, Indiana

CONSTITUTION AND BY-LAWS.

KAY C. KRICK, *Chairman*......	Columbus, Ohio
HARRY J. HOOVER.............	Cincinnati, Ohio
LESLIE B. DENNING...........	Columbus, Ohio

JOINT NATIONAL COMMITTEE ON ELECTROLYSIS.

FORREST M. TOWL, *Chairman*	New York, New York
B. C. OLIPHANT..............	Buffalo, New York
S. S. WYER..................	Columbus, Ohio

COMMITTEE OF AWARDS FOR WRINKLE DEPARTMENT.

F. W. STONE, *Chairman*.......	Ashtabula, Ohio
A. P. DAVIS..................	Pittsburgh, Pennsylvania
W. J. BRODER................	Columbus, Ohio

UNITED STATES BUREAU OF STANDARDS, GAS SAFETY CODE CONFERENCE.

SAMUEL S. WYER, *Representative* .... Columbus, Ohio

DIRECTORY OF MEMBERSHIP

(The date with each name is that of election to membership.)

HONORARY MEMBERS.

Bailey, Edgar Henry Summerfield........................May 19, 1908
Professor of Chemistry, University of Kansas, 1101 Ohio Street, Lawrence, Kansas.

Bownocker, John Adams...............................May 18, 1909
State Geologist of Ohio, Ohio State University, 185 Fifteenth Avenue, Columbus, Ohio.

Gould, Charles Newton................................May 17, 1910
Geological Engineer, 1218-19 Colcord Building, Oklahoma City, Oklahoma.

Harmon, Judson.......................................May 18, 1909
Lawyer, Cincinnati, Ohio.

Haworth, Erasmus.....................................May 21, 1907
Professor of Geology and Mining, University of Kansas, Lawrence, Kansas.

Sears, Clifton W...............................February 27, 1906
Vice President and General Manager, Central Ohio Gas & Electric Company, Wooster, Ohio.

Sweetman, Michael M.............................February 27, 1906
Secretary, New York Oil & Gas Company, 316 American Bank Building, Kansas City, Missouri.

White, Israel C.......................................May 16, 1911
State Geologist of West Virginia, 141 Willey Street, Morgantown, West Virginia.

ACTIVE MEMBERS.

Abbe, Walter, Jr......................................May 16, 1916
Chief Engineer, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Abbott, D. E..May 18, 1915
Director, Huntington Development and Gas Company, 928 Third Avenue, Huntington, West Virginia.

Abbott, E. D..May 18, 1909
Superintendent, The Springfield Gas Company, 221 North Fountain Avenue, Springfield, Ohio.

Abell, H. C...May 21, 1912
Engineer, American Light & Traction Company, 120 Broadway, New York, New York.

Adams, C. H...May 15, 1917
Field Foreman, United Natural Gas Company, Kane, R. F. D. No. 2, Pennsylvania.

Adams, Larmour .... May 21, 1912
Metric Metal Works, Tenth and Payne Avenues, Erie, Pennsylvania.

Adams, W. H .... May 16, 1916
Agent, Logan Natural Gas & Fuel Company, Ashland, Ohio.

Adams, William M .... May 16, 1916
Agent, Citizens Gas & Electric Company, 102 East Main Street, Elyria, Ohio.

Adolf, Peter P .... May 15, 1917
Agent, Lancaster, New York, Iroquois Natural Gas Company, Lancaster, New York.

Aggers, E. W .... May 15, 1917
Contractor, F. A. Aggers & Son, 145 Fraley Street, Kane, Pennsylvania.

Alberty, P. A .... May 15, 1917
Assistant Superintendent, The Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Alden, John Douglas .... May 21, 1912
Assistant Superintendent, United Gas Improvement Company, 83 Center Street, Waterbury, Connecticut.

Alexander, W. F .... May 18, 1915
Natural Gas Insurance, Clarksburg, West Virginia.

Allen, J. Foster .... May 18, 1909
District Foreman, Sinclair-Cudahy Pipe Line Company, P. O. Box 398, Drumright, Oklahoma.

Allen, S. S., Jr .... May 21, 1907
Assistant Secretary, Columbus Gas & Fuel Company, 135 North Front Street, Columbus, Ohio.

Altizer, R. G .... May 19, 1914
Vice President, United Fuel Gas Company, 1422 Kanawha Street, Charleston, West Virginia.

Amey, L. C .... May 19, 1914
Chief Engineer, Manufacturers Gas Company, Kane, Pennsylvania.

Anderson, E. J .... May 15, 1917
Superintendent, Texas Gas Company, Mexia, Texas.

Anderson, J. F .... May 16, 1916
Field Foreman, The Peoples Natural Gas Company, R. D. No. 1, Mayport, Pennsylvania.

Anderson, J. W .... May 18, 1915
Agent, United Fuel Gas Company, Ventura Hotel, Ashland, Kentucky.

Angle, J. E .... May 16, 1911
Superintendent, Fayette County Gas Company, 302 South Pittsburgh Street, Connellsville, Pennsylvania.

Apple, C. B .... May 15, 1917
12518 Clifton Boulevard, Cleveland, Ohio.

Ardizzone, Joseph .... May 21, 1912
President, The Ardizzone Company, 507-508 Bliss Building, Tulsa, Oklahoma.

Armstead, Daniel M....................................May 21, 1912
Engineer, Sales Department, Ingersoll-Rand Company, Farmers Bank Building, Pittsburgh, Pennsylvania.

Armstrong, Andrew A....................................May 18, 1909
Assistant General Manager, Union Natural Gas Corporation, 1615 Union Bank Building, Pittsburgh, Pennsylvania.

Armstrong, Thomas....................................May 15, 1917
Inspector, Iroquois Natural Gas Company, 583 West Avenue, Buffalo, New York.

Arnold, W. H....................................May 18, 1915
Representative, Pittsburgh Valve, Foundry and Construction Company, 1817 Tonapah Avenue, Pittsburgh, Pennsylvania.

Arras, Walter H....................................May 16, 1916
Chief Clerk, Purchasing Department, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Ashley, Walter A....................................May 16, 1916
Local Superintendent, Logan Natural Gas & Fuel Company, Chillicothe, Ohio.

Ashton, H. T....................................May 18, 1915
Assistant Engineer, Ohio Cities Gas Company, 135 North Front Street, Columbus, Ohio.

Atkins, I. H....................................May 16, 1916
District Manager, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Ayer, J. W....................................May 19, 1914
Sales Manager, Reznor Manufacturing Company, Reznor Street, Mercer, Pennsylvania.

Baehr, William Alfred....................................May 21, 1912
Consulting Engineer, 122 South Michigan Avenue, Chicago, Illinois.

Bagley, W. H....................................May 18, 1915
Agent, Osage & Oklahoma Company, Pioneer Building, Tulsa, Oklahoma.

Bahan, J. P....................................May 15, 1917
Clerk, The Texas Company, Natural Gas Department, 1708 Fairfield Avenue, Shreveport, Louisiana.

Baker, A. G....................................May 16, 1916
Superintendent, Tri-County Natural Gas Company, Caledonia, New York.

Baker, C. M....................................May 18, 1915
Chief Engineer, Petrolia Compressing Station, Lone Star Gas Company, Petrolia, Texas.

Baker, W. N....................................May 16, 1916
Foreman, Hope Natural Gas Company, R. F. D., Miletus, West Virginia.

Baldwin, O. M....................................May 15, 1917
Foreman, East Ohio Gas Company, 436 East Main Street, Kent, Ohio.

Ballard, A. M....................................May 19, 1914
Constructing Engineer, Wayland Oil and Gas Company, Charleston, West Virginia.

Ballard Charles R....................................May 18, 1909
Manufacturer, Ballard Patent Suction and Discharge Valves, Midway, Pennsylvania.

Ballard, H. O...May 19, 1914
Superintendent of Production, Wichita Natural Gas Company, 605 East Third Street, Bartlesville, Oklahoma.

Bane, K. H...May 18, 1915
Reserve Gas Company, Lock Box 123, Wilsonburg, West Virginia.

Barger, Louis F...May 20, 1913
General Superintendent, Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Barnes, George W...June 12, 1906
Engineer, William Penn Hotel, Pittsburgh, Pennsylvania.

Barnes, R. B...May 16, 1911
District Superintendent, United Natural Gas Company, Mill Street, Brookville, Pennsylvania.

Barnsdall, T. N., 2nd...May 19, 1914
Treasurer, The Highland Gas Company, 7 Chambers Street, Bradford, Pennsylvania.

Barr, James H...May 18, 1915
President, The National Supply Company, Pittsburgh, Pennsylvania, and Toledo, Ohio.

Barrett, M. F...May 19, 1914
President, The Cleveland Brass Manufacturing Company, 4606-26 Hamilton Avenue, Cleveland, Ohio.

Barrett, William E...May 21, 1912
Gas Engineer, J. G. White & Company, Inc., 43-49 Exchange Place, New York, New York.

Barrows, George S...May 16, 1916
Manager Gas Heating Department, General Fire Extinguisher Company, 275 West Exchange Street, Providence, Rhode Island.

Barrows, L. E...May 18, 1915
Engineer, The Texas Company Natural Gas Department, Fort Worth, Texas.

Barry, James...May 16, 1916
Foreman, Arkansas Natural Gas Company, Prescott, Arkansas.

Bartlett, E. O...May 16, 1911
Secretary-Treasurer, Moncton Tramways, Electricity & Gas Company, Limited, 1013 Farmers Bank Building, Pittsburgh, Pennsylvania.

Bartlett, John C...May 16, 1916
Secretary and Treasurer, Oklahoma Natural Gas Company, Caney River Gas Company, Enid Natural Gas Company, Assistant Secretary and Assistant Treasurer, Osage & Oklahoma Company, 1402 Union Bank Building, Pittsburgh, Pennsylvania.

Bartlett, R. H...May 16, 1911
Assistant to the President, Oklahoma Natural Gas Company, 1402 Union Bank Building, Pittsburgh, Pennsylvania.

Bartley, E. L...May 18, 1909
General Superintendent, American Natural Gas Company, Park Building, Pittsburgh, Pennsylvania.

Bartley, W. A..May 16, 1916
District Superintendent, American Natural Gas Company, Indiana, Pennsylvania.

Bartow, A. T..May 18, 1915
Distribution Engineer, Central Indiana Gas Company, Muncie, Indiana.

Bass, W. H..May 15, 1917
Foreman, Alden-Batavia Natural Gas Company, Alden, New York.

Batchelor, G. F..May 19, 1914
President, The Natural Gas Company of West Virginia, 323 Fourth Avenue, Pittsburgh, Pennsylvania.

Battin, Henry S..May 21, 1912
Assistant General Superintendent, United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania.

Bay, B. R..May 15, 1917
Chief Engineer, The Medina Gas & Fuel Company, 139 Dickson Avenue, Mansfield, Ohio.

Baxter, John..May 21, 1912
Superintendent, Tube Department, Republic Iron and Steel Company, Youngstown, Ohio.

Bauer, C. J..May 18, 1915
Purchasing Agent, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Beach, Ralph A..May 16, 1916
Assistant to Superintendent, T. W. Phillips Gas & Oil Company, 120 East Cunningham Street, Butler, Pennsylvania.

Beardsley, R. D..May 16, 1916
Assistant Treasurer, Hope Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Beaty, Elmer..May 16, 1916
Acting Superintendent, Manufacturers Gas Company, Bradford, Pennsylvania.

Bedford, A. C..May 16, 1916
Vice President, The Peoples Natural Gas Company, of Pittsburgh, President, Standard Oil Company of New Jersey, 26 Broadway, New York, New York.

Bell, Charles D..May 21, 1907
Superintendent, Kansas Natural Gas Company, 113 Miners Bank Building, Joplin, Missouri.

Benner, George K..May 16, 1916
President, Benner Drilling Tool Company, 6431-6433 Penn Avenue, East End, Pittsburgh, Pennsylvania.

Benninger, N. H..May 15, 1917
Superintendent, United Natural Gas Company, Station R, South Oil City, Pennsylvania.

Benninger, R. E..May 15, 1917
Chief Engineer, United Natural Gas Company, Hallton, Pennsylvania.

Berg, C. O..May 15, 1917
Foreman, United Natural Gas Company, Mabel Street, Reynoldsville, Pennsylvania.

Berwald, P. M.......................................May 18, 1915
General Manager, The City of Bradford Gas & Power Corporation, Bradford, Pennsylvania.

Berry, B. N.......................................May 15, 1917
Contractor, Dominion Natural Gas Company, Caledonia, Ontario, Canada.

Bevan, R. L.......................................May 18, 1915
Second Assistant Treasurer, Calgary Gas Company, Limited, 215 Sixth Avenue, West, Calgary, Alberta, Canada.

Biddison, P. McDonald.......................................May 21, 1907
Construction Engineer, Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Bieler, O.......................................May 15, 1917
Salesman, Westinghouse Electric & Manufacturing Company, 1808 Union Bank Building, Pittsburgh, Pennsylvania.

Bigelow, Lucius S.......................................May 21, 1907
President, The Periodicals Publishing Company, Littell Building, 68 West Huron Street, Buffalo, New York.

Bigler, G. K.......................................May 20, 1913
City Plant Foreman, United Natural Gas Company, Franklin, Pennsylvania.

Billingsley, J. E.......................................May 16, 1916
Assistant Geologist, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Bishop, H. W., Jr.......................................May 18, 1909
Representative, La Belle Iron Works, Steubenville, Ohio.

Black, Tom M.......................................May 16, 1916
Assistant Secretary, T. W. Phillips Gas and Oil Company, Butler, Pennsylvania.

Blackall, T. P.......................................May 15, 1917
Regulator Inspector, Iroquois Natural Gas Company, 1398 Michigan Avenue, Buffalo, New York.

Blake, B. F.......................................May 15, 1917
Chief Engineer, Treat Compressing Station, The Ohio Fuel Supply Company, Homer, Ohio.

Blauvelt, Warren S.......................................May 15, 1917
Consulting Engineer, Steere Engineering Company, Woodward and Horton Avenues, Detroit, Michigan.

Blewett, John T.......................................May 15, 1917
General Inspector, Iroquois Natural Gas Company, 75 Gold Street, Buffalo, New York.

Blinn, Arthur M.......................................May 20, 1913
Agent, Pennsylvania Gas Company, 1126-1128 Pearl Street, Erie, Pennsylvania.

Blum, William.......................................May 16, 1916
Superintendent, Sugar Grove Field, Logan Natural Gas & Fuel Company, Lancaster, Ohio.

Bodine, Samuel Taylor.......................................May 17, 1910
President, The United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania.

Boocke, C. W.......................................May 16, 1916
District Foreman, Hope Natural Gas Company, Hastings, West Virginia.

Booth, Arthur....................................May 17, 1910
Vice President, Burson Supply Company, 242-244 First Avenue, Pittsburgh, Pennsylvania.

Booth, George P....................................May 19, 1908
General Superintendent, S. R. Dresser Manufacturing Company, Bradford, Pennsylvania.

Booth, W. F....................................May 20, 1913
Manager, Little Rock Gas & Fuel Company, 624 Louisiana Street, Little Rock, Arkansas.

Boothe, R. E....................................May 16, 1911
President, R. E. Boothe Cordage Company, 250 Granville Street, Newark, Ohio.

Borchard, C. E....................................May 15, 1917
Accountant, Dominion Natural Gas Company, Limited, 842 Marine National Bank Building, Buffalo, New York.

Bormann, Clarence B....................................May 16, 1916
Engineer, Carnegie Natural Gas Company, Farmington, West Virginia.

Bower, J. B....................................May 15, 1917
Manager, Central Pipe Line Company, Reymer, Ontario, Canada.

Bowman, S. W....................................May 18, 1915
Oil and Gas Producer, Clarksburg, West Virginia.

Boyd, A. E....................................May 20, 1913
Superintendent, Ohio Fuel Supply Company, 141 East Fourth Street, Ashland, Ohio.

Boyd, G. S....................................May 18, 1915
Chief Engineer, Mooringsport Refining Company, Mooringsport, Louisiana.

Boyd, Hugh T....................................May 15, 1917
Chemist, The Ohio Fuel Supply Company, Homer, Ohio.

Boyle, E. R....................................May 15, 1917
Manager, Oil City Derrick, 7 Center Street, Oil City, Pennsylvania.

Boyle, Patrick C....................................May 20, 1913
President, The Derrick Publishing Company, 7 Center Street, Oil City, Pennsylvania.

Braden, Eugene C....................................May 16, 1916
Contractor, Ardizzone Braden Company, 507 Bliss Building, Tulsa, Oklahoma.

Braden, Glenn T....................................May 17, 1910
President, Oklahoma Natural Gas Company, 214 Pioneer Building, Tulsa, Oklahoma.

Braden, H. W....................................May 18, 1915
Purchasing Agent, Dominion Natural Gas Company, 807 Bank of Hamilton, Hamilton, Ontario, Canada.

Bradford, Floyd J....................................May 19, 1914
Vice Prsident, Parkersburg Rig and Reel Company, P. O. Box 974, Tulsa, Oklahoma.

Bradley, Harry....................................May 20, 1913
President, Empire Gas & Fuel Company, Limited, 78 North Main Street, Wellsvillle, New York.

Bradley, J. B..May 18, 1915
Secretary and Treasurer, Hornell Gas Light Company, 96 Main Street, Hornell, New York.

Brady, M. A..May 15, 1917
Foreman, Tri-County Natural Gas Company, Caledonia, New York.

Bragdon, H. K..May 15, 1917
Secretary to General Manager, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Brandel, S. F..May 15, 1917
Foreman, Peoples Natural Gas Company, Gardenville, New York.

Braun, C. J., Jr..May 16, 1911
Treasurer, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Brawley, Hugh P..May 18, 1908
Claim Agent, 361 Walnut Street, Meadville, Pennsylvania.

Brazier, John B..May 18, 1915
Vice President and General Manager, Powhatan Brass & Iron Works, North Mildred Street and Belt Line Avenue, Ranson, Jefferson County, West Virginia.

Brenner, H. H..May 21, 1912
President, Pawhuska Oil and Gas Company, Pawhuska, Oklahoma.

Brennan, H. W..May 15, 1917
Foreman, The Texas Company, Moran, Texas.

Brewster, Henry..May 16, 1916
Foreman, Hope Natural Gas Company, Weston, West Virginia.

Bridges, J. M..May 20, 1913
Agent, United Natural Gas Company, Liberty Street, Franklin, Pennsylvania.

Brinham, A. L..May 15, 1917
Clerk, Union Natural Gas Corporation, 1929 Forbes Street, Pittsburgh, Pennsylvania.

Brink, George R..May 18, 1909
Assistant Secretary-Treasurer, Union Natural Gas Corporation, Union Bank Building, Pittsburgh, Pennsylvania.

Brink, R. W..May 16, 1916
General Auditor, Hope Natural Gas Company, 26 Broadway, New York, New York.

Broder, William J..May 18, 1909
Vice President and General Manager, The Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Brooks, R. A..May 15, 1917
Secretary and Treasurer, The Medina Gas & Fuel Company, Wooster, Ohio.

Brown, Cameron..May 16, 1916
Campaign Manager, General Gas Light Company, 44 West Broadway, New York, New York.

Brown, D. J..May 18, 1919
Treasurer, Oil Well Supply Company, 213 Water Street, Pittsburgh, Pennsylvania.

Brown, E. R..May 16, 1911
General Manager, Lone Star Gas Company, Corsicana, Texas.

Brown, Louis..May 19, 1914
President, Oil Well Supply Company, 215 Water Street, Pittsburgh, Pennsylvania.

Brown, L. E. H..May 15, 1917
Field Superintendent, Potter Gas Company, Roulette, Pennsylvania.

Brown, L. H..May 15, 1917
Assistant Engineer, Iroquois Natural Gas Company, 102 Eighteenth Street, Buffalo, New York.

Brown, William Laird..May 16, 1916
Representative, Helm & McIlhenny, 1339 Cherry Street, Philadelphia, Pennsylvania.

Brown W. R..May 18, 1915
New Business Manager, The Ohio Fuel Supply Company, 97 North Front Street, Columbus, Ohio.

Bruce, W. W..May 21, 1912
Superintendent, Oklahoma Fuel Supply Company, P. O. Box "L," Chandler, Oklahoma. ...

Bruckner, O. L..May 15, 1917
Agent, Logan Natural Gas & Fuel Company, 11 West Walnut, Westerville, Ohio.

Brunner, E..May 15, 1917
Engineer, Hope Engineering & Supply Company, Mt. Vernon, Ohio.

Brundrett, Ernest L..May 21, 1907
President, Kansas City Gas Company, 910 Grand Avenue, Kansas City, Missouri.

Bryant, C. L..May 18, 1915
President, The Bryant Heater & Manufacturing Company, 952 East Seventy-second Street, Cleveland, Ohio.

Buchanan, James I..May 16, 1916
President, Taylorstown Natural Gas Company, Terminal Office Building, Pittsburgh, Pennsylvania.

Buckley, W. H..May 18, 1915
First Engineer, Rogers Compressing Station, Arkansas Natural Gas Company, Lewis, Louisiana.

Bulger, J. F..May 16, 1916
Shop Foreman, The Peoples Natural Gas Company, Turtle Creek, Pennsylvania.

Bullock, Charles L................................February 27, 1906
Superintendent Distribution Empire Gas & Fuel Company, Bartlesville, Oklahoma.

Bullock, George..May 15, 1917
Foreman, Southern Ontario Gas Company, Limited, Rodney, Ontario, Canada.

Burford, Ira S..May 16, 1916
Agent, United Fuel Gas Company, Inc., 114 North Third Street, Ironton, Ohio.

Burkhalter, R. J..May 20, 1913
Assistant Secretary and Treasurer, The Northwestern Ohio Natural Gas Company, 210-213 Huron Street, Toledo, Ohio.

Burnett, Jerome B....................................May 15, 1917
Chief Oklahoma Division, Empire Gas & Fuel Company, Bartlesville, Oklahoma.

Burns, E. G....................................May 18, 1915
Land Agent, Columbia Gas & Electric Company, 1668 Sixth Avenue, Huntington, West Virginia.

Burns, T. B....................................May 16, 1916
Shop Foreman, Hope Natural Gas Company, 1212 Julianna Street, Parkersburg, West Virginia.

Burnside, S. E. W....................................May 16, 1916
Attorney, Hope Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Burr, R. B....................................May 20, 1913
Industrial Engineer, The Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Burrell, George A....................................May 20, 1913
Consulting Chemical Engineer, Benedum-Trees Building, Pittsburgh, Pennsylvania.

Burress, George H....................................May 15, 1917
Geologist, Empire Gas & Fuel Company, Bartlesville, Oklahoma.

Burritt, D. F....................................May 18, 1915
General Superintendent, National Gas, Electric Light & Power Company, 1714 Ford Building, Detroit, Michigan.

Burson, H. W....................................May 16, 1916
President, Colonial Supply Company, 414 First Avenue, Pittsburgh, Pennsylvania.

Burtner, James C....................................May 16, 1916
Superintendent, Drilling Department, Medina Gas & Fuel Company, East Liberty Street, Wooster, Wayne County, Ohio.

Butler, C. L....................................May 15, 1917
Accountant, Dominion Natural Gas Company, Limited, 842 Marine National Bank Building, Buffalo, New York.

Cabot, Godfrey L....................................May 19, 1914
Proprietor, Plant at Cabot, Pennsylvania, 940 Old South Building, Boston, Massachusetts.

Cain, W. J....................................May 15, 1917
Division Foreman, East Ohio Gas Company, Cuyahoga Falls, Ohio.

Callanan, J. T....................................May 18, 1915
President and Treasurer, Parkersburg Machine Company, Juliana Street, Parkersburg, West Virginia.

Caffrey, George H....................................May 19, 1914
Manager, Abilene Gas & Electric Company, 126 Cypress Street, Abilene, Texas.

Campbell, Gordon M....................................May 15, 1917
Commercial Department, Union Light, Heat & Power Company, Third Street and Court Avenue, Covington, Kentucky.

Campbell, J. P....................................May 16, 1916
Foreman, Hope Natural Gas Company, Littleton, West Virginia.

Campbell, J. T....................................May 16, 1916
Agent, The Manufacturers Light & Heat Company, New Castle, Pennsylvania.

Campbell, M. L. .... May 16, 1916
Pittsburgh and West Virginia Company, Salem, West Virginia.

Cantrell, C. C .... May 17, 1910
Vice President and Manager, Central Light & Fuel Company, 21 East Hobson Avenue, Sapulpa, Oklahoma.

Cappeau, J. P., Jr .... May 16, 1911
Secretary and Treasurer, The Natural Gas Engineering Company, 801 Machesney Building, 223 Fourth Avenue, Pittsburgh, Pennsylvania.

Carey, Gail .... May 21, 1912
Secretary, The Garnett Light & Fuel Company, 319 Oak Street, Garnett, Kansas.

Carey, W. C .... May 15, 1917
Foreman Meter Repairs, Iroquois Natural Gas Company, 37 Ada Place, Buffalo, New York.

Carl, L. F .... May 15, 1917
Agent, The Newark Natural Gas & Fuel Company, 58 West Main Street, Newark, Ohio.

Carmody, M. B .... May 18, 1909
Field Manager, South Western Gas & Electric Company, 1754 Irving Place, Shreveport, Louisiana.

Carpenter, Everett .... May 19, 1914
Chief Geologist, Continental Oil & Gas Company, Bartlesville, Oklahoma.

Carpenter, George R .... May 16, 1916
Superintendent, United Fuel Gas Company, 1207 Elmwood Avenue, Charleston, West Virginia.

Carson, W. B .... May 16, 1911
Secretary, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Carter, C. E .... May 18, 1915
President, Mansfield Gas Light Company, 8 South Park Street, Mansfield, Ohio.

Carter, Clarence E .... May 18, 1915
Salesman, The Ohio Fuel Supply Company, 97 North Front Street, Columbus, Ohio.

Carter, David J .... May 18, 1916
Attorney at Law, Carter and Sheets, 419-421 Goff Building, Clarksburg, West Virginia.

Carter, O. M. May 16, 1916
President, United Gas Iron Company, 528 Peoples Gas Building, Chicago, Illinois.

Cartwright, T. R .... May 16, 1916
Superintendent, United Fuel Gas Company, Clendenin, West Virginia.

Cartwright, William Y .... May 21, 1912
Vice President, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Cassel, Howard N .... May 20, 1913
Secretary-Treasurer and General Manager, Leflore County Gas & Electric Company, Poteau, Oklahoma.

Case, L. L. .... May 15, 1917
Local Agent, Ontario Gas Company, Holcomb, New York.

Casto, A. T. .... May 16, 1916
Superintendent, Randall Gas Company, 190 Chancery Row, Morgantown, West Virginia.

Cavenau, Charles .... May 16, 1916
Foreman Reserve Gas Company, Wilsonburg, West Virginia.

Cavenagh, Frank .... May 17, 1910
General Sales Agent, Pacific Meter Company, 732 Title Insurance Building, Los Angeles, California.

Chambers, Fred N .... May 15, 1917
Oil Producer, Chambers Oil Company, 214 Chambers Building, Oil City, Pennsylvania.

Chandler, L. F. .... May 18, 1915
Superintendent, Santa Maria Gas & Power Company, 203 West Main Street, Santa Maria, California.

Chaplin, William C. .... May 17, 1910
Treasurer, The Chaplin-Fulton Mfg. Company, 34 Penn Avenue, Pittsburgh, Pennsylvania.

Chapman, W. B. .... May 16, 1916
Oil Producer, 74 Vandergrift Building, Pittsburgh, Pennsylvania.

Church, H. H. .... May 19, 1914
President and General Manager, The Killbuck & Millersburg Oil & Gas Company, Millersburg, Ohio.

Clagett, E. F. .... May 18, 1915
Engineer, The Columbus Gas & Fuel Company, 135 North Front Street, Columbus, Ohio.

Clapp, G. N .... May 18, 1909
Secretary-Treasurer and General Manager, Washington Gas & Electric Company, Washington C. H., Ohio.

Clark, C. L. .... May 15, 1917
Foreman, Iroquois Natural Gas Company, 95 Mechanic Street, Bradford, Pennsylvania.

Clark, Earl A .... May 16, 1911
Proportional and Domestic Service, Meter Testing, 217 A. W. 5th, Tulsa, Oklahoma.

Clark, James .... May 19, 1914
Division Superintendent, Philadelphia Company, 17th and Wharton Streets, Pittsburgh, Pennsylvania.

Clark, J. S. .... May 19, 1914
Manager, Okmulgee Gas Company, 319 West Sixth Street, Okmulgee, Oklahoma.

Clark, Robert E .... May 16, 1916
Assistant Land Agent, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Clark, Walton .... May 21, 1907
Second Vice-President, United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania.

Clarkson, R. J. .... May 19, 1914
Division Superintendent, Philadelphia Company of West Virginia, Littleton, West Virginia.

Clawson, W. B. .... May 15, 1917
Superintendent, Warren & Chant Gas Company, 309 Poplar Street, Warren, Pennsylvania.

Cleary, J. D. .... May 15, 1917
Agent, Angola, New York. Iroquois Natural Gas Company, Angola, New York.

Clifford, Thomas C. .... May 16, 1911
Sales Manager, Pittsburgh Meter Company, East Pittsburgh, Pennsylvania.

Cline, Walter B. .... May 21, 1912
President, Los Angeles Gas & Electric Corporation, 645 South Hill Street, Los Angeles, California.

Clover, J. N. .... May 15, 1917
President, The Iron Mountain Oil Company, Tulsa, Oklahoma.

Clover, M. K. .... May 18, 1915
Manager, Berea Pipeline Company, 9 Front Street, Berea, Ohio.

Clover, S. C. .... May 15, 1917
Oil and Gas Department, The Iron Mountain Oil Company, Tulsa, Oklahoma.

Cluley, C. F. .... May 20, 1913
Agent, The East Ohio Gas Company, Millersburg, Ohio.

Cochran, Horace J. .... May 18, 1915
President and Manager, Maysville Gas Company, Maysville, Kentucky.

Cohn, Charles M. .... May 21, 1912
Vice President, Cons. Gas Electric Light & Power Company, of Baltimore, 100 West Lexington Street, Baltimore, Maryland.

Cole, E. J. .... May 16, 1911
Purchasing Agent and Auditor, Arkansas Natural Gas Company, State Bank Building, Little Rock, Arkansas.

Cole, W. G. .... May 16, 1911
Division Superintendent, Equitable Gas Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Coleman, L. G. .... May 19, 1914
Engineer, Henry L. Doherty & Company, 60 Wall Street, New York, New York.

Collins, Frank .... May 18, 1915
Vice President, National Supply Company, President, Toledo Pipe Threading Machine Company, Toledo, Ohio.

Connelly, J. S. .... June 12, 1906
President, Port Arthur Gas & Power Company, Port Arthur, Texas.

Connors, Eugene F. .... May 15, 1917
President, Guffey Gasoline Company, Bradford, Pennsylvania.

Conners, J. P. .... May 15, 1917
Cashier, Iroquois Natural Gas Company, 1106 Main Street, Buffalo, New York.

Cookham, P. J. .... May 15, 1917
Superintendent, Berea Pipe Line Company, 88 Furnace Street, Berea, Ohio.

Cooper, H. C .... May 20, 1913
General Superintendent, Hope Natural Gas Company, Clarksburg, West Virginia.

Corbett, M. A. .... May 17, 1910
Secretary, Corbett-Stevens Company, Huntington Bank Building, Columbus, Ohio.

Corbus, C. D. .... May 20, 1913
Manager, Welsbach Company, 429 Main Street, Cincinnati, Ohio.

Corcoran, W. F. .... May 21, 1907
Contractor, James G. Corcoran Company, 415 House Building, Pittsburgh, Pennsylvania.

Cork, D. W. .... May 18, 1915
Oil and Gas Producer, Clarksburg, West Virginia.

Corrin, John B .... May 20, 1913
Vice President, The Hope Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Cosan, Frank .... May 15, 1917
Land Department Clerk, Dominion Natural Gas Company, 842 Marine Bank Building, Buffalo, New York.

Coste, Dillon .... May 20, 1913
Secretary, The Canadian Western Natural Gas, Light, Heat & Power Company, Limited, 215 Seventh Avenue, East, Calgary, Alberta, Canada.

Coste, D. A. .... May 15, 1917
Treasurer, Provincial Natural Gas Company, Niagara Falls, Ontario, Canada.

Coste, Eugene .... May 20, 1913
President, The Canadian Western Natural Gas, Light, Heat & Power Company, Limited, 128 Seventh Avenue, East, Calgary, Alberta, Canada.

Covey, A. F .... May 18, 1915
Superintendent, Dominion Natural Gas Company, 807 Bank of Hamilton Building, Hamilton, Ontario, Canada.

Courtney, D. H .... May 18, 1915
President, Randall Gas Company, 179 High, Morgantown, West Virginia.

Cowham, H. I .... May 21, 1912
Manager Land Department, Kasigan Oil, Gas & Power Company, 115½ East Main Street, Independence, Kansas.

Cox, Frank .... May 18, 1915
Secretary, Navajo Gas Company, Charleston, West Virginia.

Coyle, Henry .... May 18, 1909
Superintendent, Mains and Field, Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Craft, Charles .... May 16, 1911
Chief Engineer, East Ohio Gas Company, West Park, Ohio.

Crahan, B. J .... May 17, 1910
Superintendent, Joplin Gas Company, 318 Joplin Street, Joplin, Missouri.

Craig, Albert B. .... May 16, 1916
Geologist, Greensboro Gas Company, 248 Fourth Avenue, Pittsburgh, Pennsylvania.

Craig, W. P. .... May 20, 1913
General Superintendent, United Natural Gas Company, 308 Seneca Street, Oil City, Pennsylvania.

Cratty, James M. .... May 15, 1917
Foreman Meter Department, Pennsylvania Gas Company, Jamestown, New York.

Crawford, A. A. .... May 16, 1916
General Superintendent, Manufacturers Gas Company, 87 Congress Street, Bradford, Pennsylvania.

Crawford, C. E. .... May 16, 1911
Director, Ohio Fuel Supply Company, 2017 Farmers Bank Building, Pittsburgh, Pennsylvania.

Crawford, C. J. .... May 16, 1916
1028 Liberty Street, Franklin, Pennsylvania.

Crawford, David B. .... May 16, 1911
General Manager, Parkersburg Rig and Reel Company, 450 Second Street, Parkersburg, West Virginia.

Crawford, F. H. .... May 16, 1911
Chief Engineer, The Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Crawford, Frederick W .... May 18, 1909
President, United Fuel Gas Company, 52 West Gay Street, Columbus, Ohio.

Crawford, George W .... May 17, 1910
President, Ohio Fuel Supply Company, 2017 Farmers Bank Building, Pittsburgh, Pennsylvania.

Crawford, James B .... May 16, 1911
President, United Natural Gas Company, 308 Seneca Street, Oil City, Pennsylvania.

Crawford, John M .... May 16, 1911
President, Parkersburg Rig & Reel Company, Box 624, Parkersburg, West Virginia.

Crawford, J. W. R. .... May 16, 1911
61 Broadway, New York, New York.

Crawford, R. A. .... May 20, 1913
Vice President and Manager, Oblong Gas Company, West Main Street, Palestine, Illinois.

Crawford, Ronald B. .... May 20, 1913
Superintendent, United Natural Gas Company, 116 Bissell Avenue, Oil City, Pennsylvania.

Creveling, J. D .... May 15, 1917
Consulting Engineer, Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Critchfield, C. F. .... May 16, 1916
Special Inspector, The Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Cronin, John M .... May 18, 1915
Assistant Superintendent, Columbia Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Crosby, G. A. .... May 16, 1916
Surveyor, Land Department, Potter Gas Company, 1011 Farmers Bank Building, Pittsburgh, Pennsylvania.

Cross, F. A. .... May 20, 1913
Chief Station Engineer, United Natural Gas Company, Ten Mile Bottom, Pennsylvania.

Cross, Raymond .... May 16, 1911
Vice President and General Manager, United Natural Gas Company, 308 Seneca Street, Oil City, Pennsylvania.

Crossett, John .... May 16, 1911
Division Superintendent, Philadelphia Company, Arch Street, Kittanning, Pennsylvania.

Crowe, R. R. .... May 19, 1914
Agent, United Natural Gas Company, 75 Main Street, Bradford, Pennsylvania.

Crowl, P. E. .... May 15, 1917
Agent, Potter Gas Company, Galeton, Pennsylvania.

Crum, M. C. .... May 16, 1916
Agent, The Peoples Natural Gas Company, Monessen, Pennsylvania.

Cullinan, M. P. .... May 20, 1913
President, Border Gas Company, 1418 Chihuahua Street, Laredo, Texas.

Culp, Harry C. .... May 15, 1917
Salesman, Ingersoll Rand Company, Williamson Building, Cleveland, Ohio.

Cumings, C. E. .... May 19, 1914
President and General Manager, East Brady Gas & Fuel Company, East Brady, Pennsylvania.

Cummings, Con .... May 21, 1912
Contractor, 115 North Fourth Street, Independence, Kansas.

Cummings, E. A. .... May 15, 1917
Assistant Treasurer, Moncton Tramways, Electricity & Gas Company, Limited, Moncton, New Brunswick, Canada.

Cunningham, J. C. .... May 18, 1909
General Superintendent, West Virginia and Maryland Gas Company, 9½ South Centre Street, Cumberland, Maryland.

Cunningham, R. H. .... May 16, 1916
Sales Engineer, Ingersoll-Rand Company, 1226 Farmers Bank Building, Pittsburgh, Pennsylvania.

Curry, J. F. .... May 16, 1911
Superintendent, Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Curry, J. P. .... May 20, 1913
Agent, United Natural Gas Company, 15 Vine Street, Sharon, Pennsylvania.

Curtis, Austin G. .... May 19, 1908
General Manager, Southwestern Gas & Electric Company, 116 Texas Street, Shreveport, Louisiana.

Cusack, W. M. .... May 20, 1913
Treasurer, Iroquois Natural Gas Company, 45 Church Street, Buffalo, New York.

Cushing, J. W. .... May 15, 1917
Oil and Gas Producer, Sistersville, West Virginia.

Cushing, Robert W. .... May 19, 1914
Field Superintendent, Natural Gas Company of West Virginia, Leetonia, Columbiana County, Ohio.

Custer, Z. B. .... May 19, 1908
Vice President, Custer Coupling Company, 39 Foreman Street, Bradford, Pennsylvania.

Cypher, M. B. .... May 16, 1916
Contractor and Producer, Marwood, Pennsylvania.

Dailey, Eugene .... May 15, 1917
Administration Department, Wichita Natural Gas Company, Bartlesville, Oklahoma.

Dallow, J. C. .... May 18, 1909
Representative, The National Supply Company, Lancaster, Ohio.

Daily, A. B. Jr .... May 18, 1909
President and Manager, South Hills Oil and Gas Company, 1501 Benedum Trees Building, Pittsburgh, Pennsylvania.

Daily, C. A. Jr. .... May 20, 1913
Manager, Reserve Natural Gas Company of Louisiana, P. O. Box 191, Shreveport, Louisiana.

Daly, Martin B .... May 18, 1909
President and General Manager, The East Ohio Gas Company, East Ohio Gas Building, 1405 East Sixth Street, Cleveland, Ohio.

Daugherty, O. J. .... May 18, 1915
Superintendent, La Belle Gas & Oil Company, 220 West Street, Steubenville, Ohio.

Dauler, Harvey N .... May 15, 1917
President, Petroleum Products Company, 39th Street, and B. & O. Ry., Pittsburgh, Pennsylvania.

Davies, O. L. .... May 18, 1915
Agent, United Fuel Gas Company, 814 Fourth Avenue, Huntington, West Virginia.

Daviee, Stuart W .... May 16, 1916
Cashier, The Calgary Gas Company, Limited, 215 Sixth Avenue, West Calgary, Allberta, Canada.

Davies, W. B. .... May 15, 1917
Foreman, United Gas Companies, Limited, St. Catherines, Ontario, Canada.

Davies, William B .... May 16, 1916
Superintendent, The United Gas Companies, Limited, 45 King Street, St. Catherines, Ontario, Canada.

Davie, A. P. .... May 20, 1913
Commercial Manager, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Davis, Herbert R .... May 21, 1907
General Superintendent, Dominion Gas Company, Limited, Marine National Bank Building, Buffalo, New York.

Davis, Merrill N .... May 16, 1916
Special Representative, The B. F. Goodrich Company, Akron, Ohio.

Dawes, Beman G.......................................May 17, 1910
President, Columbus Gas & Fuel Company, 135 North Front Street, Columbus, Ohio.

Dawes, Henry M.......................................May 17, 1910
President, Pulaski Gas Light Company (Little Rock, Arkansas), 1615 Harris Trust Building, Chicago, Illinois.

Deal, E. O.......................................May 15, 1917
The East Ohio Gas Company, 714 High Street, S. W., Canton, Ohio.

Dean, H. Alexander.......................................May 16, 1916
President, Elk Natural Gas Company, 223 Fourth Avenue, Pittsburgh, Pennsylvania.

Deemer, F. C.......................................May 18, 1909
Gas & Oil Operator, 200 Jefferson Street, Brookville, Pennsylvania.

DeForest, C. W.......................................May 15, 1917
Electrical Engineer, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Delaney, Joseph P.......................................May 20, 1913
City Superintendent, The Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Denning, Leslie B.......................................May 16, 1911
General Counsel, Ohio Fuel Supply Company, 50 East Broad Street, Columbus, Ohio.

Denton, Dorr T.......................................May 15, 1917
Division Superintendent, Iroquois Natural Gas Company, 46 Clarendon, Buffalo, New York.

Devericks, Filmore C.......................................May 16, 1916
Independent Producer, 251 Buena Vista Avenue, Clarksburg, West Virginia.

DeWitt, D. C.......................................May 15, 1917
Lease Department, Southern Gas Company, Box 767, Corpus Christi, Texas.

Dibbens, W. J.......................................May 19, 1908
Vice President and General Manager, Guthrie Gas Light, Fuel & Improvement Company, 213 East Oklahoma Avenue, Guthrie, Oklahoma.

Diescher, Alfred J.......................................May 18, 1909
Vice President and General Manager, Empire Gas & Fuel Company, Empire Building, Bartlesville, Oklahoma.

Dietrich, C. R.......................................May 16, 1916
Agent, The Peoples Natural Gas Company, Turtle Creek, Pennsylvania.

Dill, S. J.......................................May 21, 1912
President, Leavenworth, Kansas Light, Heat & Power Company, 40 Wall Street, New York, New York.

Dimick, W. H.......................................May 20, 1913
Agent, The East Ohio Gas Company, 202 West High Street, New Philadelphia, Ohio.

Dingman, L. R.......................................May 16, 1916
District Foreman, Equitable Gas Company, 685 Corey Avenue, Braddock, Pennsylvania.

Dittman, C. E. .... May 17, 1910
Manager, Waynesburg Home Gas Company, Waynesburg, Pennsylvania.

Dittman, D. M .... May 15, 1917
Foreman, Iroquois Natural Gas Company, Hamburg, New York.

Ditto, William A .... May 16, 1916
Superintendent, Bradford Gas Company, Roulette, Pennsylvania.

Dixon, Philip .... May 18, 1909
Superintendent, St. Marys Gas Company, St. Marys, Pennsylvania.

Dodds, Caryl J .... June 12, 1906
General Manager, Citizens Light, Heat and Power Company, 5 East Henry Street, Lawrence, Kansas.

Doherty, Henry L .... February 27, 1906
President, Cities Service Company, 60 Wall Street, New York, New York.

Doherty, James A .... May 20, 1913
Manager, Woodstock Gas Light Company, Woodstock, Ontario, Canada.

Dolen, R. F .... May 16, 1916
Foreman, Pittsburgh & West Virginia Gas Company, 965 West Pike Street, Clarksburg, West Virginia.

Dooling, F. T .... May 15, 1917
Machinist, East Ohio Gas Company, 10501 Hathaway Avenue, Cleveland, Ohio.

Donahue, G. C .... May 15, 1917
Pressure Department, East Ohio Gas Company, 9301 Columbia Avenue, Cleveland, Ohio.

Donaldson, F. N .... May 16, 1911
Owner, Donaldson Gas Company, Jewett, Ohio.

Donnelly, William E .... May 16, 1916
General Superintendent, Northeastern Oil & Gas Company, 17 North Broadway, Geneva, Ohio.

Donovan, B. H .... May 20, 1913
Foreman, Pennsylvania Gas Company, 1021 French Street, Erie, Pennsylvania.

Doty, W. J .... May 15, 1917
Leaser, South Shore Natural Gas & Fuel Company, Sheridan, New York.

Dougherty, F. D .... May 16, 1916
Superintendent Gas Wells, William Harris Company, Wooster, Wayne County, Ohio.

Douglass, Silas M .... May 18, 1909
General Counsel, Logan Natural Gas & Fuel Company, 22½ South Park Street, Mansfield, Ohio.

Douthirt, W. F .... May 21, 1907
Fourth Vice President, United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania.

Dowd, Bernard F .... May 15, 1917
Manager, Peoples Natural Gas Company, 39 Argyle Park, Buffalo, New York.

Downing, C. W.......................................May 20, 1913
Assistant Secretary and Treasurer, East Ohio Gas Company, East Sixth Street, Cleveland, Ohio.

Doyle, Frederick F....................................May 19, 1914
Assistant Chief Engineer, Midway Gas Company, Box N, Taft, California.

Dreher, R. G..May 15, 1917
Accountant, Dominion Natural Gas Company, Limited, 842 Marine National Bank Building, Buffalo, New York.

Dreibelbis, H. H......................................May 21, 1912
Division Superintendent, The Ohio Fuel Supply Company, 59 North Fourth Street, Zanesville, Ohio.

Dresser, Carl K.......................................May 15, 1917
Secretary and Treasurer, S. K. Dresser Mfg. Company, 54 Boyleston Street, Bradford, Pennsylvania.

Droppleman, W. J.....................................May 16, 1916
Foreman, Hope Natural Gas Company, McWhorter, West Virginia.

Drury, George F......................................May 15, 1917
Oil Producer, J. W. Leonard Oil Company, North Main Street, Washington, Pennsylvania.

Duffield, C. S...May 16, 1916
Purchasing Agent, United Fuel Gas Company, Quarrier Street, Charleston, West Virginia.

Duffield, James C.....................................May 20, 1913
Managing Director, London City Gas Company, London, Ontario, Canada.

Duncan, John...May 16, 1911
General Manager of Sales, Wheeling Steel & Iron Company, Wheeling, West Virginia.

Dunham, Carl Cyrus..................................May 16, 1916
Meter Department, Pittsburgh & West Virginia Gas Company, 3 Center Avenue, Weston, West Virginia.

Dumm, T. A..May 15, 1917
Field Superintendent, Potter Gas Company, Port Allegany, Pennsylvania.

Dusenberry, D. F......................................May 16, 1916
Gas Engineer, West Virginia Traction & Electric, and City & Suburban Gas Company, 298 Wiles Street, Morgantown, West Virginia.

Eastland, S. H...May 16, 1916
District Foreman, Philadelphia Company, 23rd and Main Streets, Sharpsburg, Pennsylvania.

Edwards, William C..................................May 16, 1916
Vice President, Parker & Edwards Oil Company, Union Bank Building, Pittsburgh, Pennsylvania.

Egan, E. J..May 16, 1916
Agent, The Manufacturers Light & Heat Company, Millbridge and Manton Streets, Pittsburgh, Pennsylvania.

Elbert, Vincent L....................................May 19, 1914
General Manager, St. Joseph Gas Company, Eighth and Francis Streets, St. Joseph, Missouri.

Emmerling, Karl...May 18, 1915
Chemist, The East Ohio Gas Company, 3105 Walton Avenue, Cleveland, Ohio.

Engle, T. W...May 19, 1914
Division Superintendent, Pittsburgh & West Virginia Gas Company, 537 West Main Street, Grafton, West Virginia.

Ernst, H. M...May 18, 1915
President, Dempseytown Gas Company, Treet Company Building, Oil City, Pennsylvania.

Espach, Frank..May 18, 1915
Chief Inspector, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Evans, C. D...May 16, 1911
Division Superintendent, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Evans, J. J..May 18, 1915
Division Superintendent, Hope Natural Gas Company, Clarksburg, West Virginia.

Ewing, A. M...May 15, 1917
Meter Department, Central Station Gas Company, 214 South 5th, Vincennes, Indiana.

Ewing Frederick..May 15, 1917
Leasing Superintendent, Medina Gas & Fuel Company, The Columbus Natural Gas Company, Wooster, Ohio.

Ewing, J. J..May 16, 1916
House Piper, Own business, 952 Fifth Avenue, Coraopolis, Pennsylvania.

Fair, F..May 18, 1915
South Shore Natural Gas & Fuel Company, 307 Central Avenue, Dunkirk, New York.

Fairchild, F. A..May 15, 1917
Agent, United Natural Gas Company, 901 Water Street, Meadville, Pennsylvania.

Falk, F. I...May 18, 1915
Assistant Treasurer, The Ohio Fuel Supply Company, 2017 Farmers Bank Building, Pittsburgh, Pennsylvania.

Falk, G. E...May 15, 1917
Cashier, South Shore Natural Gas & Fuel Company, 307 Central Avenue, Dunkirk, New York.

Farner, J. W...May 16, 1916
Superintendent, Potter Gas Company, Port Allegany, Pennsylvania.

Fay, Peter..May 15, 1917
Field Superintendent, Potter Gas Company, R. F. D. No. 2, Smethport, Pennsylvania.

Felix, Otto F...May 21, 1912
Secretary and Treasurer, Equitable Meter Company, 422 First Avenue, Pittsburgh, Pennsylvania.

Fessler, T. A...May 15, 1917
Agent, Potter Gas Company, Elkland, Pennsylvania.

Field, Roy A. .... May 18, 1915
New Business Manager, National Gas, Electric Light & Power Company, 1714 Ford Building, Detroit, Michigan.

Filler, W. H. .... May 20, 1913
Secretary and Treasurer, Pennsylvania Gas Company, 213 Second Avenue, Warren, Pennsylvania.

Finley, H. F. .... May 16, 1916
Agent, Logan Natural Gas & Fuel Company, Mansfield, Ohio.

Finney, Frank F. .... May 17, 1910
Superintendent of Gas Lines, Indian Territory Illuminating Oil Company, Bartlesville, Oklahoma.

Fischer, George J .... May 21, 1907
Secretary and Manager, Modern Iron Works, Quincy, Illinois.

Fish, Harry P .... May 20, 1913
General Foreman, The East Ohio Gas Company, 207 Regent Street, Youngstown, Ohio.

Fisher, Francis P .... May 21, 1907
Assistant General Manager, Wichita Natural Gas Company, Pioneer Telephone Building, Bartlesville, Oklahoma.

Fisler, John .... May 15, 1917
Foreman, Akron Natural Gas Company, Akron, New York.

Flanigan, J. T. .... May 15, 1917
Foreman, Iroquois Natural Gas Company, 20 Weyand Street, Buffalo, New York.

Fleming, Arthur C .... May 18, 1915
Superintendent, Pennsylvania Fuel Supply Company, Broad Street, New Bethlehem, Pennsylvania.

Fleming, Claude M .... May 16, 1916
Foreman, Hope Natural Gas Company, 202 Locust Street, Mannington, West Virginia.

Fleming, Curtis B .... May 16, 1916
Producer Oil and Gas, P. O. Box 193, Fairmont, West Virginia.

Fleming, George F .... May 15, 1917
Agent, United Natural Gas Company, 120 West Spence Street, Titusville, Pennsylvania.

Flinn, T. W. H .... May 16, 1916
Appliances, Flinn Appliance House, 607 West Main Street, Denison, Texas.

Flint, R. B. .... May 15, 1917
Meter Inspector, Potter Gas Company, Port Allegany, Pennsylvania.

Flocken, Alfred F .... May 16, 1916
Bookkeeper, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Foley, John .... May 18, 1915
General Field Superintendent, Manufacturers Light and Heat Company, Canonsburg, Pennsylvania.

Foley, T. B. .... May 16, 1916
Contractor, T. B. Foley, 410 Diamond Bank Building, Pittsburgh, Pennsylvania.

Foley, T. H...May 16, 1916
Superintendent, T. B. Foley, Contractor, 410 Diamond Bank Building, Pittsburgh, Pennsylvania.

Fonner, J. H...May 16, 1916
Shop Foreman and Agent, The Peoples Natural Gas Company, 616 Midland Avenue, Midland, Pennsylvania.

Ford, John C...May 18, 1915
District Superintendent, South Penn Oil Company, Union Trust Building, Charleston, West Virginia.

Foreman, H. A...May 16, 1911
Vice President, Eastern Oil Company, 312 Fidelity Building, Buffalo, New York.

Forstall, Alfred E...May 21, 1912
Consulting Engineer, Forstall and Robison, 84 William Street, New York, New York.

Foster, H. V...May 21, 1912
President, Indian Territory Illuminating Oil and Gas Company, 111 East Eighth Street, Bartlesville, Oklahoma.

Foster, J. E...May 20, 1913
Agent, The East Ohio Gas Company, 107 North Erie Street, Massillon, Ohio.

Foster, D. H...May 18, 1915
Secretary, Ohio Oil Association, 808 Harrison Building, Columbus, Ohio.

Fox, E. C...May 18, 1915
Manager, The Gas Appliance Company, 713 Frankfort Avenue, Cleveland, Ohio.

Frainer, J. E...May 18, 1915
Sun Gas Company, Salem, West Virginia.

Fralic, F. A...May 15, 1917
Agent and Superintendent, Logan Natural Gas & Fuel Company, 139 West Main Street, Galion, Ohio.

Frantz, I. D...May 16, 1916
Foreman, Hope Natural Gas Company, Smithville, West Virginia.

Franz, W. E...May 18, 1915
Street Foreman, Natural Gas Department, The Dayton Gas Company, 218 South Jefferson Street, Dayton, Ohio.

Frazier, J. E...May 18, 1915
Superintendent, Charleston-Dunbar Natural Gas Company, 404 Ruffner Avenue, Charleston, West Virginia.

Freeman, W. W...May 18, 1915
President, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Frees, W. H...May 16, 1916
Rig Building, 661 Buckeye Street, Wooster, Ohio.

French, F. A...May 15, 1917
Agent, Potter Gas Company, Port Allegany, Pennsylvania.

Freudenberger, Wm...May 18, 1915
President, Freudenberger Oil Company, 504 Charleston National Bank Building, Charleston, West Virginia.

Frevert, Robert A. .... May 15, 1917
Industrial Engineer, Dayton Gas Company, Dayton, Ohio.

Frey, W. S. .... May 15, 1917
Agent, Logan Natural Gas & Fuel Company, 209 South Sandusky Avenue, Bucyrus, Ohio.

Friedenberg, D. .... May 18, 1909
Auditor, Union Natural Gas Corporation, 34 Ruggery Building, Columbus, Ohio.

Frohrieb, L. C. .... May 16, 1911
Secretary, Federal Engineering Company, 1116 House Building, Pittsburgh, Pennsylvania.

Fuller, E. K. .... May 15, 1917
Agent, East Aurora, New York, Iroquois Natural Gas Company, East Aurora, New York.

Fulsom, H. .... May 15, 1917
Foreman, Woodstock Gas Company, 523 Dundas Street, Woodstock, Ontario, Canada.

Funk, F. O. .... May 19, 1914
Oil and Gas Operators, Cochran & Funk, Eighth Street, Moundsville, West Virginia.

Funk, W. T. .... May 18, 1915
Auditor, Oil and Gas Companies, Commercial Bank Building, Titusville, Pennsylvania.

Fye, J. L. .... May 16, 1911
Division Superintendent, Philadelphia Company, 261 High Street, Waynesburg, Pennsylvania.

Fyfe, A. D. .... May 15, 1917
Geologist, Empire Fuel & Gas Company, Bartlesville, Oklahoma.

Gage, W. P. .... May 17, 1910
Vice President and General Manager, Lone Star Gas Company, 807-8-9-10 First National Bank Building, Fort Worth, Texas.

Gager, H. A. .... May 18, 1915
The Natural Gas Company of West Virginia, 156 East Fifth Street, Salem, Ohio.

Gale, Glen N. .... May 15, 1917
Superintendent Glenwood Station, Southern Ontario Gas Company, Limited, R. R. No. 4, Merlin, Ontario, Canada.

Gallagher, C. E. .... May 20, 1913
Agent, The East Ohio Gas Company, Youngstown, Ohio.

Gallagher, R. W. .... May 21, 1913
Assistant General Manager, The East Ohio Gas Company, East Ohio Gas Building, Cleveland, Ohio.

Garard, Charles H. .... May 19, 1914
Superintendent, Southern Ohio Division, The Ohio Fuel Supply Company, 124 North Pennsylvania Avenue, Wellston, Ohio.

Garard, F. L. .... May 16, 1916
Assistant Superintendent and Agent, Fayette County Gas Company, 403 First National Bank Building, Uniontown, Pennsylvania.

Garard, John M. .... May 18, 1909
Vice President and General Manager, The Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Gardner, C. W. .... May 16, 1916
Engineering Department, The East Ohio Gas Company, East Ohio Gas Building, Cleveland, Ohio.

Garner, J. B. .... May 16, 1916
Chemical Engineer, Hope Natural Gas Company, 5624 Woodmont Street, Pittsburgh, Pennsylvania.

Garrity, M. J .... May 16, 1916
District Foreman, Equitable Gas Company, 9th Street, McKeesport, Pennsylvania.

Gassdorf, G. I. .... May 16, 1916
Superintendent of Construction, The Huntington Development & Gas Company, 928 Third Avenue, Huntington, West Virginia.

Gassett, A. L .... May 19, 1908
President, Economy Stove Company, 2108 Superior Viaduct, Cleveland, Ohio.

Gates, C. B. .... May 20, 1913
Chief Clerk, The East Ohio Gas Company, 1405 East Sixth Street, Cleveland, Ohio.

Gates, John Jr .... May 16, 1911
Attorney, Land Department, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Gavin, A. W .... May 15, 1917
Assistant City Superintendent, Iroquois Natural Gas Company, 486 Linwood Avenue, Buffalo, New York.

Geary, D. J. .... May 16, 1911
Sales Manager, Republic Iron & Steel Company, Republic Building, Youngstown, Ohio.

Geist, Jay .... May 15, 1917
Superintendents Clerk, United Fuel Gas Company, Spencer, West Virginia.

Geist, J. F. .... May 16, 1916
Field Superintendent, United Fuel Gas Company, Ravenswood Pike, Spencer, West Virginia.

Germer, E. G. .... May 20, 1913
President, Germer Stove Company, 16th and Parade Streets, Erie, Pennsylvania.

Gericke, Oscar C .... May 15, 1917
Chemical Engineer, East Ohio Gas Company, 3182 West 14th Street, S. W., Cleveland, Ohio.

Gessel, B. M .... May 15, 1917
President, Anchor Oil Company, 1108 South Cheyenne, Tulsa, Oklahoma.

Gibson, C. A .... May 19, 1908
Kansas Natural Gas Company, P. O. Drawer 465, Independence, Kansas.

Gibson, W . C. .... May 17, 1910
Manager, Wichita Falls Gas Company, Kemp and Kell Building, Wichita Falls, Texas.

Giegel, F. G. .... May 20, 1913
General Foreman, The Northwestern Ohio Natural Gas Company, 210-212 Huron Street, Toledo, Ohio.

Gifford, B. J..May 21, 1912
Superintendent, Little Rock Gas & Fuel Company, 113 West Sixth Street, Little Rock, Arkansas.

Gilbert, A. J..May 16, 1916
Foreman, Arkansas Natural Gas Company, Malvern, Arkansas.

Gill, John E..May 16, 1911
President, Manufacturers Light & Heat Company, 310 Columbia Bank Building, Pittsburgh, Pennsylvania.

Gilmore, Frank M..May 21, 1907
Secretary-Manager, Mound Valley Natural Gas & Oil Company, Mound Valley, Kansas.

Gindele, Albert H..May 18, 1915
Industrial Gas Engineer, Toledo Railway & Light Company, 1120 Norwood Avenue, Toledo, Ohio.

Given, E..May 18, 1915
Field Superintendent, The East Ohio Gas Company, 6110 Franklin Avenue, Cleveland, Ohio.

Glasgow, Arthur Graham..May 21, 1912
Chairman, Humphreys & Glasgow, Limited, 36 and 38 Victoria Street, London, S. W., England.

Glass John..May 16, 1911
Chief Engineer, Carnegie Natural Gas Company, 245 North Bridge Street, Waynesburg, Pennsylvania.

Glass, Roy..May 16, 1916
Engineer, Carnegie Natural Gas Company, Hastings, West Virginia.

Gleason, C. W..May 20, 1913
Division Engineer, United Natural Gas Company, 507 North Street, Oil City, Pennsylvania.

Goble, Benjamin F..May 15, 1917
Foreman, United Natural Gas Company, Shinglehouse, Potter County, Pennsylvania.

Goff, George S..May 17, 1910
General Manager, Crystal Gas Company, 26 East Market Street, Corning, New York.

Goldsborough, J. R..May 19, 1914
Titusville, Supply Company, 1520 Farmers Bank Building, Pittsburgh, Pennsylvania.

Goodnow, Robert W..May 21, 1912
City Gas Inspector, City of Kansas City, City Hall, Kansas City, Missouri.

Goodrich, H. B...May 17, 1910
Consulting Geologist, Ardmore, Oklahoma.

Grace, Clarence H..May 16, 1916
Manager, Gas Journal Publishers, Limited, Hamilton, Ontario, Canada.

Graffis, W. H...May 20, 1913
Publisher (President) Gas Publishing Company (The Gas Record), 347 Monadnock Block, Chicago, Illinois.

Graham, Lyman L...May 20, 1913
Secretary, United Natural Gas Company, 206 Seneca Street, Oil City, Pennsylvania.

Grammel, B. J..May 18, 1915
Purchasing Agent, Iroquois Natural Gas Company, 45 Church Street, Buffalo, New York.

Grant, C. E..May 18, 1915
Agent, Pennsylvania Fuel Supply Company, 416 Main Street, Emlenton, Pennsylvania.

Gray, A. R..May 16, 1916
Assistant General Superintendent, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Gray, Homer R..May 20, 1913
Assistant Treasurer, Iroquois Natural Gas Company, Iroquois Building, Buffalo, New York.

Gray, J. F..May 20, 1913
Chief Engineer, The East Ohio Gas Company, 1405 East Sixth Street, Cleveland, Ohio.

Grear, W. S..May 19, 1908
District Superintendent, Welsbach Lighting Company of America, Peoples Gas Building, Chicago, Illinois.

Greenawalt, E. J..May 18, 1915
Trunk Line Foreman, Columbia Gas & Electric Company, 1206 Jefferson Avenue, Huntington, West Virginia.

Greis, Harry N..May 21, 1912
President, Atlantic Petroleum Corporation, Tulsa, Oklahoma.

Gribble, Wallace B..May 15, 1917
Special Representative, Hope Natural Gas Company, Empire National Bank Building, Clarksburg, West Virginia.

Griswold, Robert G..May 18, 1915
Chief Technologist, Henry L. Doherty & Company, 60 Wall Street, New York, New York.

Griswold, William T..May 16, 1911
Geologist, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Groble, J. C..May 16, 1916
Assistant Manager, Reynolds Gas Regulator Company, Anderson, Indiana.

Grosscup, Fred Paul..May 18, 1915
President, Charleston-Dunbar Natural Gas Company, Charleston, West Virginia.

Grosscup, Paul B..May 18, 1915
Vice President and General Manager, Charleston-Dunbar Natural Gas Company, Charleston, West Virginia.

Grunder, F. D..May 15, 1917
Assistant General Sales Manager, Tube Department, Jones & Laughlin Steel Company, 412 Jones and Laughlin Building, Pittsburgh, Pennsylvania.

Guffey, Joseph F..May 16, 1911
General Manager, The Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Gurnsey, W. M..May 18, 1909
Superintendent, Crystal City Gas Company, 26 East Market Street, Corning, New York.

Guitteau, W. S. .... May 18, 1915
Sales Manager, Lloyd Construction Company, 860 Greenwood Avenue, Detroit, Michigan.

Gwynn, E. F. .... May 18, 1909
President, Gwynn Gas Burner & Engineering Company, 713 Empire Building, Pittsburgh, Pennsylvania.

Hackstaff, John D. .... June 12, 1906
General Manager, Empire Pipe Line Company, Bartlesville, Oklahoma.

Hackstaff, Richard G. .... May 15, 1917
Empire Pipe Line Company, Bartlesville, Oklahoma.

Hadley, F. L. .... May 16, 1911
Superintendent of Lines, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Hadley, W. R. .... May 19, 1908
Secretary-Treasurer, The Union Natural Gas Corporation, 1608 Union Bank Building, Pittsburgh, Pennsylvania.

Hagen, O. C. .... May 16, 1916
General Manager, Drilling Department, Ohio Fuel Supply Company, 75 Huffman Avenue, Columbus, Ohio.

Hagan, W. C. .... May 18, 1915
Mechanical Engineer, The East Ohio Gas Company, 7918 Hough Avenue, Cleveland, Ohio.

Hall, C. T. .... May 16, 1911
Oil and Gas Operator, Bula Oil Company, 74 Vandergrift Building, Pittsburgh, Pennsylvania.

Hall, Henry C. .... May 15, 1917
General Bookkeeper, Iroquois Natural Gas Company, 72 Charlotte Avenue, Buffalo, New York.

Hall, H. E. .... May 15, 1917
Accountant, Dominion Natural Gas Company, Limited, 842 Marine Bank Building, Buffalo, New York.

Hall, Herman H. .... May 16, 1916
Agent, The Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Hall, Jesse J. .... May 16, 1916
Accountant, Randall Gas Company, 190 Chancery Row, Morgantown, West Virginia.

Hall, T. A. .... May 15, 1917
Engineer, Dominion Natural Gas Company, Limited, Bank of Hamilton Building, Hamilton, Ontario, Canada.

Hamilton, W. R. .... May 18, 1915
General Manager, Montebello Oil Company, 433 California Street, San Francisco, California.

Hammon, M. E. .... May 15, 1917
Foreman, South Shore Natural Gas & Fuel Company, 307 Central Avenue, Dunkirk, New York.

Hampton, Robert S. .... May 15, 1917
President, Frankfort, Kentucky, Natural Gas Company, Titusville, Pennsylvania.

Hanchett, F. C. .... May 16, 1916
Foreman, United Natural Gas Company, 329 West Walnut Street, Titusville, Pennsylvania.

Hanks, J. G......................................May 20, 1913
Superintendent, The East Ohio Gas Company, 1405 East Sixth Street, Cleveland, Ohio.

Hanley, T. L......................................May 15, 1917
Superintendent, Hanley & Bird, Jackson Avenue, Bradford, Pennsylvania.

Hann, Thomas D......................................May 16, 1911
General Manager, Greensboro Gas Company, Brownsville, Pennsylvania.

Hannan, Robert W......................................May 16, 1911
Oil and Gas Producer, 76-78 Vandergrift Building, Pittsburgh, Pennsylvania.

Hannon, D. W......................................May 15, 1917
Division Foreman, East Ohio Gas Company, 1007 Garfield Avenue, S. W., Canton, Ohio.

Hare, A. S......................................May 18, 1915
Cashier, The Natural Gas Company of West Virginia, 1226 Chaplin Street, Wheeling, West Virginia.

Hare, C. Willing......................................May 17, 1910
Manager, New Business Department, The United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania.

Harney, H., Jr......................................May 15, 1917
Inspector, Iroquois Natural Gas Company, 83 Edna Place, Buffalo, New York.

Harrington, D. P......................................May 19, 1914
Assistant to General Superintendent, The Texas Company, Natural Gas Department, P. O. Drawer 983, Fort Worth, Texas.

Harrington, H. H......................................May 15, 1917
Superintendent, Citizens Gas & Electric Company, 563 West Third Street, Elyria, Ohio.

Harris, George S......................................May 20, 1913
Chief Bookkeeper, The East Ohio Gas Company, 1405 East Sixth Street, Cleveland, Ohio.

Hartzell, A. C......................................May 19, 1908
Treasurer, Greenville Natural Gas Company, Canal Street, Greenville, Pennsylvania.

Harwood, J. Arch......................................May 18, 1915
Civil Engineer, The Natural Gas Company of West Virginia, 41 Vine Street, Salem, Ohio.

Hastings, A. L......................................May 15, 1917
Field Foreman, Oklahoma Natural Gas Company, Tulsa, Oklahoma.

Hastings, John......................................May 16, 1916
Foreman, Iroquois Natural Gas Company, Hamburg, New York.

Hastings, William......................................May 20, 1913
Division Superintendent, Iroquois Natural Gas Company, 306 Iroquois Building, Buffalo, New York.

Hatfield, J. S......................................May 19, 1914
Assistant Superintendent, Killbuck & Millersburg Oil & Gas Company, Millersburg, Ohio.

Hawk, C. M....................................May 15, 1917
Chief Engineer, Logan Natural Gas & Fuel Company, Sugar Grove, Ohio.

Hawkins, B. J....................................May 16, 1916
Auditor, Eastern Oil Company, 312 Fidelity Building, Buffalo, New York.

Hay, Ralph W....................................May 18, 1909
Assistant General Superintendent and Purchasing Agent, The Manufacturers Light & Heat Company, 248 Fourth Avenue, Pittsburgh, Pennsylvania.

Haymaker, F. B....................................May 18, 1915
Treasurer, The Producers Gas Company, 316 Main Street, Clarksburg, West Virginia.

Haymond, E. L....................................May 18, 1915
General Manager, Haymond Company, 103 South Mulberry Street, Muncie, Indiana.

Hays, Victor....................................May 21, 1907
General Auditor, Kansas Natural Gas Company, Sixth and Maple Streets, Independence, Kansas.

Hazeltine, Roy S....................................May 16, 1916
Assistant Chief Geologist, Continental Oil & Gas Company, Box 578, Bartlesville, Oklahoma.

Hazlett, F. S....................................May 16, 1916
Foreman, Hope Natural Gas Company, West Union, West Virginia.

Hazlett, Ira I....................................May 16, 1916
Secretary, Jackson Pike Oil & Gas Company, New Lexington, Ohio.

Healey, F. R....................................May 18, 1915
Superintendent, Electrical Distribution, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Healey, J. H....................................May 16, 1916
Assistant Treasurer, Potter Gas Company, Pittsburgh, Pennsylvania.

Heard, T. J....................................May 18, 1915
Secretary and Treasurer, Reserve Natural Gas Company of Louisiana, 208 Ward Building, Shreveport, Louisiana.

Heasley, Harry....................................May 16, 1911
President, Oklahoma Fuel Supply Company, 11½ Main Street, Tulsa, Oklahoma.

Heath, C. R....................................May 19, 1908
President, Middletown Gas Company, Middletown, Indiana.

Heazlett, Frank....................................May 16, 1916
Shop Foreman, The Peoples Natural Gas Company, Blairsville, Pennsylvania.

Heazlett, William....................................May 16, 1916
Shop Foreman, The Peoples Natural Gas Company, Latrobe, Pennsylvania.

Heck, A. S....................................May 18, 1915
Manager, Goff and Heck, Spencer, West Virginia.

Heeter, C. M .... May 16, 1916
President, C. M. Heeter Sons & Company, Inc., Duff City Gas Company, North Lima Gas Company, 251 South McKane Street, Butler, Pennsylvania.

Hegerty, F. P .... May 16, 1911
Representative, Westinghouse Electric & Manufacturing Company, 1808 Union Bank Building, Pittsburgh, Pennsylvania.

Heggem, A. G .... May 16, 1916
Petroleum Engineer, Consulting, 512-513 Danial Building, Tulsa, Oklahoma.

Helm, Charles L .... May 20, 1913
Agent, The East Ohio Gas Company, 137 Public Square, Wooster, Ohio.

Henderson, James Alexander Leo .... May 16, 1911
Director and Technical Advisor, New Brunswick Gas & Oil Fields Company, Limited, 3 London Wall Building. London, E. C., England.

Henderson, John I .... May 16, 1916
Engineer, The Logan Natural Gas Company, 34 Ruggery Building, Columbus, Ohio.

Hennessey, George F .... May 16, 1916
United Fuel Gas Company, 1810 McClung Street, Charleston, West Virginia.

Henning, J. A .... May 15, 1917
Clerk, Manufacturers Gas Company, Kane, Pennsylvania.

Henning, M. H .... May 18, 1915
Superintendent, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Herr, J. P .... May 16, 1916
Advertising Manager, Tulsa Daily World, Tulsa, Oklahoma.

Herring, A. W .... May 15, 1917
General Manager, The Commercial Oil & Gas Company, 172 Main Street, Ashtabula, Ohio.

Herron, F. W .... May 15, 1917
Secretary, Producers Gas Company, 300 First National Bank Building, Olean, New York.

Heuperman, F. J .... May 18, 1915
Engineer, Calgary Gas Company, Limited, 215 Sixth Avenue, West, Calgary, Alberta, Canada.

Heydrick, James C .... May 16, 1916
Box 596, Irvine, Kentucky.

Hickernell, George W .... May 15, 1917
Agent, Pennsylvania Gas Company, 213 Second Avenue, Warren, Pennsylvania.

Higgins, W. C .... May 20, 1913
Manager, Contract Department, The East Ohio Gas Company, East Ohio Gas Building, Cleveland, Ohio.

Hildabrand, J. S .... May 16, 1916
Field Superintendent, South Hills Oil & Gas Company, R. F. D. No. 1, Fair Haven, Pennsylvania.

Hildebrand, H. D .... May 19, 1914
President, Hope Engineering & Supply Company, 1319 Farmers Bank Building, Pittsburgh, Pennsylvania.

Hill, Charles E .... May 18, 1915
Superintendent, Alden-Batavia Natural Gas Company, 71 Main Street, Batavia, New York.

Hill, Dudley M .... May 16, 1916
Assistant to Mechanical Engineer, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Hill, J. B .... May 16, 1911
Manager, Welsbach Company, 621 Liberty Avenue, Pittsburgh, Pennsylvania.

Hill, W. W .... May 19, 1914
Acting Chief Engineer, Quapaw Company, Bartlesville, Oklahoma.

Hilty, John .... May 16, 1916
Shop Foreman, The Peoples Natural Gas Company, Altoona, Pennsylvania.

Hinerman, G. L .... May 19, 1914
Division Superintendent, Philadelphia Company of West Virginia, Weston, West Virginia.

Hitchcock, Otto G .... May 18, 1909
Secretary and General Manager, Hays Manufacturing Company, Twelfth and Liberty Streets, Erie, Pennsylvania.

Hockstetter, Ralph .... May 15, 1917
Gas Producer, Gunsburg & Forman, Fidelity Building, Buffalo, New York.

Hoagland, H. C .... May 17, 1910
General Manager, Muskogee Gas & Electric Company, Muskogee, Oklahoma.

Hodge, W. H .... May 15, 1917
Publicity Manager, H. M. Blyyesby & Company, 208 South La Salle Street, Chicago, Illinois.

Hoffman, H. R .... May 15, 1917
Acting Chief Clerk, General Office, Iroquois Natural Gas Company, 131 Monroe Street, Buffalo, New York.

Hogg, Herman B .... May 18, 1915
District Manager, National Supply Company, Parkersburg, West Virginia.

Holbrook, David Oliver .... May 19, 1908
Vice President, Natural Gas Association of America, 904-905 Oliver Building, Pittsburgh, Pennsylvania.

Holbrook Lynn .... May 20, 1913
Purchasing Agent, The United Natural Gas Company, 306 Seneca Street, Oil City, Pennsylvania.

Holland, H. T .... May 15, 1917
Chief Engineer, Wheeler Compressing Station, The Northwestern Ohio Natural Gas Company, Sugar Grove, Ohio.

Holliday, F. M .... May 15, 1917
National Transit Company, Marwood, Pennsylvania.

Holly, W. M .... May 15, 1917
Field Superintendent, Potter Gas Company, Shinglehouse, Pennsylvania.

Holmes, A. G .... June 12, 1906
Vice President and Manager, Pittsburgh Meter Company, P. O. Box 252, East Pittsburgh, Pennsylvania.

Holtz, W. H..May 20, 1913
Chief Clerk, General Office, The East Ohio Gas Company, 1447 East Sixth Street, Cleveland, Ohio.

Hoover, H. J..May 20, 1913
Commercial Manager, Gas Department, The Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Hopp, Henry C..May 16, 1911
Manager, Malta & McConnellsville Gas Company, Malta, Ohio.

Horner, Boyd E..May 16, 1911
Oil and Gas Operator, Horner Building, Clarksburg, West Virginia.

Horner, Lynn S..May 16, 1911
Superintendent, Washington Gas Company, Horner Building, Clarksburg, West Virginia.

Horsley, George H..May 16, 1916
Purchasing Agent, East Ohio Gas Company, 1290 West 103d Street, Cleveland, Ohio.

Horton, F. J..May 19, 1908
General Manager, Portland Gas & Pipe Line Company, 402 South Elm Street, Iola, Kansas.

Hottinger, R. L..May 18, 1909
Meter Repairer, Logan Natural Gas & Fuel Company, 534 Second Street, Fremont, Ohio.

Hottle, A. G..May 16, 1916
Superintendent, Arco Oil Company, South Street, Wooster, Wayne County, Ohio.

Hovis, Park..May 16, 1916
Gas Well Driller and Inventor, Wooster, Ohio.

Hovis, W. A..May 16, 1916
Foreman, United Natural Gas Company, Clermont, Pennsylvania.

Howard, G. E..May 18, 1915
Master Mechanic, The Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Howard, J. W..May 15, 1917
Field Foreman, Medina Gas Company, Vienna, Ontario, Canada.

Howard, W. E..May 15, 1917
Foreman, Brantford Gas Company, Limited, Brantford, Ontario, Canada.

Howard, R. B..May 16, 1916
Agent, Hope Natural Gas Company, 17 Clarksburg Street, Mannington, West Virginia.

Hoyte, Walter S..May 21, 1907
First Vice President and General Manager, Wichita Natural Gas Company, Suite 727 Beacon Building, Wichita, Kansas.

Huff, C. F..May 20, 1913
Superintendent, The Clarion Gas Company, Clarion, Pennsylvania.

Hughes, William K..May 21, 1912
Vice President, The Continental Supply Company, 918 Third National Bank Building, St. Louis, Missouri.

Hull, H. D..........May 18, 1915
Field Superintendent, Medina Gas & Fuel Company, Wooster, Ohio.

Humphreys, Alexander C..........May 21, 1912
President, Stevens Institute of Technology, Buffalo Gas Company, and Humphreys & Miller, Inc., 165 Broadway, New York, New York.

Hunter, Campbell M..........May 20, 1913
Oil Mining Expert, Thomas & Hunter, 3 Lambard Street, London, E. C., England.

Hunter, W. E..........May 15, 1917
Vice President, Randall Gas Company, Morgantown, West Virginia.

Hurd, Franklin R..........May 15, 1917
East Ohio Gas Company, 1442 East 109th Street, Cleveland, Ohio.

Hurlburt, Alfred..........May 16, 1911
Engineer, Kansas City Gas Company, 910 Grand Avenue, Kansas City, Missouri.

Hutchinson, Frank..........May 20, 1913
Sales Manager, The Gas Appliance Company, 713 Frankfort Avenue, West Cleveland, Ohio.

Hutchinson, H. D..........May 16, 1911
Contractor, 60 Lincoln Street, Uniontown, Pennsylvania.

Hutchinson, J. E..........May 16, 1916
Auditor, Lone Star Gas Company, Praetoriam Building, Dallas, Texas.

Hutchinson, W. P..........May 18, 1915
Vice President and Sales Manager, The Sprague Meter Company, Bridgeport, Connecticut.

Hutchison, E. H..........May 18, 1915
Producer and Contractor, Harmony, Pennsylvania.

Ikard, L. D..........May 16, 1916
Field Foreman, Columbus Producing Company, Miami, West Virginia.

Inghram, D. W..........May 16, 1916
Field Foreman, The Peoples Natural Gas Company, Burgettstown, Pennsylvania.

Irwin, J. W..........May 16, 1916
Manager, Ohio Pipe & Supply Company, West Park, Ohio.

Irwin, R. W..........May 15, 1917
Agent, The Ohio Fuel Supply Company, 120 South Detroit Street, Xenia, Ohio.

Isherwood, J. H..........May 15, 1917
Gasoline Operator, Potter Gas Company, Shinglehouse, Pennsylvania.

Ivory, E. D..........May 16, 1916
Industrial Department, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Jackson, Frank G..........May 20, 1913
Chief Station Engineer, United Natural Gas Company, R. F. D. No. 1, Hallton, Elk County, Pennsylvania.

Jackson, G. H .... May 16, 1916
Gas Department, Monongahela Valley Traction Company, Fairmont, West Virginia.

Jacobs, P. C .... May 16, 1911
Superintendent, Ohio Gas Meter Company, 2355 Lakeside Avenue, Cleveland, Ohio.

Jacoby, H. L .... May 15, 1917
Foreman, Producers Gas Company, Olean, New York.

James, D. K .... May 20, 1913
Sales Manager, American Railway Appliance Company, 105 West Third Street, Oil City, Pennsylvania.

James, Robert C .... May 17, 1910
General Auditor, The United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania.

Jarvies, T. B .... May 19, 1908
Secretary, Jarvies Burner, Heating & Plumbing Company, 4022 Belleview Avenue, Kansas City, Missouri.

Jay, C. H .... May 16, 1916
General Auditor, Ohio Cities Gas Company, 135 North Front Street, Columbus, Ohio.

Jay, D. C .... May 18, 1915
Superintendent, Leasing Department, United Fuel Gas Company, Quarrier Street, Charleston, West Virginia.

Jenkins, Howard .... May 16, 1916
Chief Engineer, Hope Natural Gas Company, Hardy Apartments, Mechanic Street, Clarksburg, West Virginia.

Jimerson, Deo .... May 18, 1915
Chief Engineer, Columbia Gas & Electric Company, R. F. D. No. 1, Kenova, West Virginia.

Johnson, C. W .... May 15, 1917
Assistant to Vice President, Hope Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Johnson, Frank .... May 15, 1917
Fieldman, Iroquois Natural Gas Company, Hamburg, New York.

Johnston, Norwood .... May 15, 1917
Superintendent, Carnegie Natural Gas Company, Carnegie Building, Pittsburgh, Pennsylvania.

Johnson, Paul R .... May 15, 1917
General Manager, The Gas Pipe Line Corporation, 123 Main Street, Independence, Kansas.

Johnson, Roswell H .... May 16, 1916
Consulting Geologist, Johnson & Huntley, 1039 Murrayhill Avenue, Pittsburgh, Pennsylvania.

Johnson, Russell A .... May 20, 1913
Purchasing Agent, Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Jones, Clement Ross .... May 16, 1916
Consulting Engineer, Randall Gas Company, Morgantown, West Virginia.

Jones, E. T .... May 15, 1917
Division Foreman, East Ohio Gas Company, Cleveland, Ohio.

Jones, George H..May 20, 1913
Comptroller, East Ohio Gas Company, 26 Broadway, New York, New York.

Jones, Hoyle..May 18, 1915
Manager of Sales, La Belle Iron Works, 605 R. A. Long Building, Kansas City, Missouri.

Jones, Hugh T..May 21, 1912
Jones Gas Company, 225 West Main Street, Chanute, Kansas.

Jones, T. C..June 12, 1906
President, The Delaware Gas Company, 68 North Sandusky Street, Delaware, Ohio.

Jones, Thomas J..May 16, 1916
Superintendent, Hope Natural Gas Company, 330 Locust Street, Mannington, West Virginia.

Jones, T. J..May 18, 1915
Manager, The Columbus Gas & Fuel Company, 135 North Front Street, Columbus, Ohio.

Jordan, E. W..May 21, 1912
Gas Engineer, Bessemer Gas Engine Company, Grove City, Pennsylvania.

Jordan, George E..May 18, 1915
Engineer, Louisiana Gas Company, Mooringsport, Louisiana.

Jordan, G. R..May 18, 1915
Civil Engineer, Southwestern Gas & Electric Company, 116 Texas Street, Shreveport, Louisiana.

Judge, W. J..May 20, 1913
Vice President, National Fuel Gas Company, 26 Broadway, New York, New York.

Kanitz, Jacques..May 19, 1914
Generaldirector, der Ungarischen Gasgluehlicht A G., VI., Vaczikorult 3, Budapest, Hungary.

Kay, J. M..May 16, 1916
Field Superintendent, Glenshaw Natural Gas Company, Glenshaw, Pennsylvania.

Keenan, J. E..May 16. 1916
District Foreman, Equitable Gas Company, 6306 Penn Avenue, Pittsburgh, Pennsylvania.

Kellogg, E. B..May 15, 1917
Superintendent, Alden-Batavia Natural Gas Company, Batavia, New York.

Kellogg, Franklin L..May 16, 1911
Field Manager, Ontario Gas Company, Honeoye Falls, New York.

Kellum, B. J..June 12, 1906
Manager, Western Department, Welsbach Company, 629 Washington Boulevard, Chicago, Illinois.

Kelly, J. W..May 16, 1911
Salesman, Jarecki Manufacturing Company, 311 First Avenue, Pittsburgh, Pennsylvania.

Kenney, A. E..May 16, 1916
President, Kenney Land & Oil Company, Box 564, Parkersburg, West Virginia.

Kennedy, J. J .... May 16, 1911
General Manager of Sales, National Tube Company, Frick Building, Pittsburgh, Pennsylvania.

Kent, J. F .... May 18, 1915
President, Pelham Oil & Gas Company, Huntington, West Virginia.

Kerr, A. N .... May 15, 1917
General Superintendent, Riverside & Western Oil Company, Benedum-Trees Building, Pittsburgh, Pennsylvania.

Kerr, Peter M .... May 16, 1916
Superintendent of Drilling, T. W. Phillips Gas & Oil Company, 613 Woodward Avenue, Kittanning, Pennsylvania.

Kerr, T. H .... May 18, 1915
Engineer, Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Ketchum, D. A .... May 18, 1915
Assistant General Superintendent, United Fuel Gas Company, Quarrier Street, Charleston, West Virginia.

Ketler, W. G .... May 16, 1916
Agent, The Peoples Natural Gas Company, 701 Center Street, Wilkinsburg, Pennsylvania.

Kidd, J. W .... May 16, 1916
Chief Clerk, Hope Natural Gas Company, 477 Campbell Street, Wilkinsburg, Pennsylvania.

Kidner, R. L .... March 20, 1906
Manager, Century Stove & Manufacturing Company, 1223-25 West Tenth Street, Kansas City, Missouri.

Kiesel, Charles .... May 15, 1917
Foreman, East Ohio Gas Company, 714 Robbins Avenue, Niles, Ohio.

Kightlinger, A. D .... May 16, 1917
Field Foreman, The Manufacturers Light & Heat Company, Washington, Pennsylvania.

Kilpatrick, R. B .... May 18, 1915
Superintendent, Windsor Gas Company, 202 Ouellette Avenue, Windsor, Ontario, Canada.

Kimmel, C. F .... May 16, 1916
Division Superintendent, Manufacturers Gas Company, Marlin Building, Brookville, Pennsylvania.

Kincheloe, L. G .... May 16, 1916
Foreman, Hope Natural Gas Company, 319 St. Clair Avenue, Clarksburg, West Virginia.

King, E. J .... May 18, 1915
Vice President, The Huntington Development & Gas Company, 928 Third Avenue, Huntington, West Virginia.

King, J .... May 16, 1916
Superintendent, Allegheny Heating Company, 603 Burd Street, North Side, Pittsburgh, Pennsylvania.

King, W. S .... May 16, 1916
Field Foreman, The Peoples Natural Gas Company, Murraysville, Pennsylvania.

Kingsley, T. C....................................May 16, 1916
Oil Producer, Kingsley & Burgess, Middlebourne, West Virginia.

Kinley, George A....................................May 16, 1916
Stenographer, Hope Natural Gas Company, 1130 Ross Avenue, Wilkinsburg, Pennsylvania.

Kirk, F. W....................................May 21, 1912
Superintendent, Pipe Lines, Lone Star Gas Company, 807 First National Bank Building, Fort Worth, Texas.

Kitchen, James W....................................May 20, 1913
Assistant Secretary and Treasurer, Pennsylvania Gas Company, 213 Second Street, Warren, Pennsylvania.

Klein, L. C....................................May 15, 1917
Manager, West Park Office, Continental Supply Company, West Park, Ohio.

Kline, Virgil P., Jr....................................May 20, 1913
Assistant to Superintendent, Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Klingensmith, J. M....................................May 16, 1916
Shop Foreman, The Peoples Natural Gas Company, 116 Hawthorn Avenue, Greensburg, Pennsylvania.

Klise, John J....................................May 16, 1916
The Klise, Eckstein, McCann Company, Lancaster, Ohio.

Klumpp, John Bartleman....................................May 19, 1908
Inspecting Engineer, United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania.

Knapp, Frank....................................May 16, 1916
General Manager, Pittsburgh Water Heater Company, Pittsburgh, Pennsylvania.

Knapp, Isaac N....................................May 21, 1912
116 Ardmore Avenue, Ardmore, Pennsylvania.

Knight, William H....................................May 19, 1908
General Manager, Cleveland Gas Meter Company, 2180 East Sixty-fifth Street, Cleveland, Ohio.

Knowles, W. R....................................May 16, 1916
Superintendent, Pressure Department, The East Ohio Gas Company, 10832 Greenlawn Avenue, Cleveland, Ohio.

Kohl, W. G....................................May 15, 1917
Agent, Logan Natural Gas & Fuel Company, 10 South Pleasant Street, Norwalk, Ohio.

Koontz, L. V....................................May 18, 1915
President, Koontz Oil & Gas Company, Clendenin, West Virginia.

Kramer, C. W....................................May 15, 1917
Chief Engineer, Arkansas Natural Gas Company, State Bank Building, Little Rock, Arkansas.

Krause, Charles....................................May 20, 1913
Inspector, The Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Krebs, Oscar....................................May 18, 1916
Main Line Foreman, Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Krick, Kay C......................................February 27, 1906
Vice President, The Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Lackey, Frank......................................May 18, 1915
Superintendent, Crescent Oil & Gas Company, Glenwillard, Pennsy vania.

Ladd, George T......................................May 16, 1911
President, The George T. Ladd Company, 1620 Farmers Bank Building, Pittsburgh, Pennsylvania.

Lakamp, J. H......................................May 20, 1913
General Superintendent, Operating Department, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Lambing, J. A......................................May 18, 1909
1023 Franklin Avenue, Wilkinsburg, Pennsylvania.

Landis, H. K......................................May 16, 1916
Managing Editor, The Gas Age, 52 Vanderbilt Avenue, New York, New York.

Lansley, John W......................................May 18, 1915
Secretary, Southwestern Gas & Electric Company, 1615 Harris Trust Building, Chicago, Illinois.

Larkham, W. E......................................May 15, 1915
Foreman, Calgary Gas Company, 2022 Center Street, North, Calgary, Alberta, Canada.

Larkin, J. J......................................May 17, 1910
Larkin Brothers, Bartlesville, Oklahoma.

Larkin, W. H......................................May 18, 1909
Manager, Larkin & Company, Butler, Pennsylvania.

Lathrop, Alanson P......................................May 17, 1910
President, American Light & Traction Company, The Equitable Building, 120 Broadway, New York, New York.

Laughlin, James P......................................May 15, 1917
General Foreman, Street Department, The East Ohio Gas Company, 19 North High Street, Akron, Ohio.

Lavell, Lon......................................May 16, 1916
Foreman, Hope Natural Gas Company, Fairview, West Virginia.

Law, C. H......................................May 16, 1911
General Superintendent, Ridgway Light & Heat Company, 16 North Broad Street, Ridgway, Pennsylvania.

Law, Robert, Jr......................................May 16, 1911
President, The Quapaw Gas Company, 1320 Farmers Bank Building, Pittsburgh, Pennsylvania.

Layton, Miles B......................................May 16, 1911
Assistant Manager, Manufacturers Light & Heat Company, 312 Columbia Bank Building, Pittsburgh, Pennsylvania.

Leamy, Alan......................................May 18, 1909
Manager, Middle West Department, Welsbach Company, 116-122 East Chestnut Street, Columbus, Ohio.

Leamon, William G......................................May 15, 1917
Chemist, Medina Gas & Fuel Company, Liberty and Market Streets, Wooster, Ohio.

Leard, R. C .... May 18, 1915
Superintendent, United Fuel Gas Company, Kermit, West Virginia.

Leathers, J. H .... May 16, 1916
Foreman, Equitable Gas Company, 306 Fuller Apartments, Donora, Pennsylvania..

Lee, Thomas M .... May 20, 1913
Superintendent, Trunk Lines, The East Ohio Gas Company, Canton, Ohio.

LeFevre, Harry E .... May 17, 1910
Contractor and Stockholder, American Natural Gas Company, Lexington Avenue and Fourth Street, Aspinwall, Pennsylvania.

Lehman, I. L .... May 16, 1916
Commercial Manager, The Dayton Gas Company, Dayton, Ohio.

Leidicker, F. H .... May 16, 1916
Leidicker Tool Company, Marietta, Ohio.

Leight, Harry G .... May 16, 1916
Foreman, Meter Repair Department, Logan Natural Gas & Fuel Company, Mansfield, Ohio.

Leland, Edward D .... May 16, 1911
Superintendent, Compressing Stations, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Leland, R. M .... May 15, 1917
Assistant Superintendent of Compressing Stations, Philadelphia Company- Pittsburgh, Pennsylvania.

Leonard, A. W .... May 19, 1908
General Manager, Oklahoma Fuel Supply Company, Box 938, Tulsa, Oklahoma.

Leonard, Charles F .... May 20, 1913
Gas Engineer, Public Service Commission, Second District, Albany, New York.

Leonard, John .... May 16, 1916
Field Superintendent, Manufactures Gas Company, Kane, Pennsylvania.

Leonard, J. W .... May 15, 1917
Oil Producer, J. W. Leonard Oil Company, 339 East Bean Street, Washington Pennsylvania.

Levy, F. A .... May 19, 1914
Vice President, Gulf Pipe Line Company, Schenley Hotel, Pittsburgh, Pennsylvania.

Lepper, E. L .... May 16, 1916
Agent, Logan Natural Gas & Fuel Company, East North Street, Fostoria, Ohio.

LeRoy, Frank O .... May 15, 1917
Chief Clerk Chart Department, Hope Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Leslie, Frederick C .... May 15, 1917
Auditor, The Manufacturers Light & Heat Company, 248 Fourth Avenue, Pittsburgh, Pennsylvania.

Lewis, A. H .... May 20, 1913
Agent, Fremont Gas, Electric Light & Power Co., Fremont, Ohio.

Lewis, Phil .... May 16, 1911
Foreman, The East Ohio Gas Company, 240 North Second Street, Cuyahoga Falls, Ohio.

Lewis, T. L .... May 21, 1912
Assistant Manager of Sales,, A. M. Byers Company, 235 Water Street, Pittsburgh, Pennsylvania.

Light, George .... May 18, 1915
Superintendent, Dayton Gas Company, 234 North St. Clair Street, Dayton, Ohio.

Lillie, Lewis .... May 21, 1907
Third Vice President and Treasurer, The United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania.

Lindsay, Robert J .... May 18, 1909
Assistant Secretary-Treasurer, Hope Engineering & Supply Company, 411 Pioneer Building, Tulsa, Oklahoma.

Lindsay, Roy .... May 15, 1917
Foreman, Dominion Natural Gas Company, Limited, Dunnville, Ontario, Canada.

Lindsay, W. R .... May 16, 1916
Assistant to Vice President, Oklahoma Petroleum & Gasoline Company, Box 921, Tulsa, Oklahoma.

Little, Perry A .... May 15, 1917
Producer Natural Gas and Oil, White Building, Buffalo, New York.

Lobaugh, W. H .... May 15, 1917
Field Manager, Pavilion Natural Gas Company, Pavilion, New York.

Lockhart, Robert .... May 16, 1916
Ohio Fuel Oil Company, Charleston, West Virginia.

Lobell, Henry O .... May 16, 1916
Industrial Fuel Engineer, Henry L. Doherty & Company, 60 Wall Street, New York, New York.

Logue, James J .... May 16, 1916
Superintendent, Reserve Gas Company, 241 North River Avenue, Weston, West Virginia.

Lohr, G. C .... May 18, 1915
Agent, The East Ohio Gas Company, 37 Main Street, Warren, Ohio.

Long, W. A .... May 16, 1916
Foreman, Arkansas Natural Gas Company, Vivian, Louisiana.

Longnecker, W. C .... May 16, 1911
Treasurer, Toledo Pipe Threading Machine Company, 1445 Summit Street, Toledo, Ohio.

Lord, R. S .... May 18, 1909
Vice President and Treasurer, Hope Engineering & Supply Company, Mount Vernon, Ohio.

Louis, Frank I .... May 21, 1912
District Manager, The National Supply Company of Kansas, 506 South Elwood Avenue, Tulsa, Oklahoma.

Loveland, Elmer .... May 18, 1909
Superintendent, Logan Natural Gas & Fuel Company, 511 Sandusky Avenue, Fremont, Ohio.

Loveridge, Guy H .... May 15, 1917
Chief Clerk, Land Department, Iroquois Natural Gas Company, 33 Inwood Place, Buffalo, New York.

Lowry, Frank M .... May 18, 1915
President and General Manager, Dominion Natural Gas Company, 842 Marine National Bank Building, Buffalo, New York.

Luebecker, Paul .... May 15, 1917
Compressing Station Department, Manufacturers Light & Heat Company, 1417 Chaplin Street, Wheeling, West Virginia.

Lupher, Preston W .... May 18, 1908
Vice President, The Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Luther, George M .... May 16, 1916
Foreman, The Manufacturers Light & Heat Company, 802 Third Street, Moundsville, West Virginia.

Lutz, Carl H .... May 15, 1917
Civil Engineer, Dominion Natural Gas Company, 842 Marine National Bank Building, Buffalo, New York.

Lynch, G. D .... May 15, 1917
Stock Man, Dominion Natural Gas Company, 209 Washington Avenue, Batavia, New York.

Lynn, James T .... May 21, 1907
President, National Gas, Electric Light & Power Company, 1714 Ford Building, Detroit, Michigan.

Lyon, J. F .... May 16, 1916
Meter Inspector, T. W. Phillips Gas and Oil Company, Butler, Pennsylvania.

Lyon, M. P .... May 18, 1915
Oil and Gas Broker, Hotel Tulsa, Tulsa, Oklahoma.

Lytle M. E .... May 16, 1911
Superintendent, The Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Lytle, V. H .... May 16, 1916
Representative, American Manufacturing Company of Brooklyn, New York, Box 504, Marietta, Ohio.

Macbeth, Alexander B .... May 21, 1907
Vice President and General Manager, Southern California Gas Company, 805 Garland Building, Los Angeles, California.

Magrew, B. A .... May 16, 1916
Engineer, The Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Mahan, G. F .... May 21, 1907
Vice President, National Supply Company, of Kansas, Independence, Kansas.

Mahoney, John T .... May 15, 1917
President, Commercial Oil Company, 17 Main Street, Buffalo, New York.

Mallory, L. E .... May 21, 1912
Oil and Gas Business, L. E. Mallory & Son, Bradford, Pennsylvania.

Maloney, J. L .... May 15, 1917
District Superintendent, Central Ohio Gas & Electric Company, Box 390, Wooster, Ohio.

Manley, H. E..May 20, 1913
Clerk, Magnolia Petroleum Company, 2805 Swiss Avenue, Dallas, Texas.

Manning, William E.................................May 16, 1911
General Manager of Sales, Youngstown Sheet & Tube Company, Stambaugh Building, Youngstown, Ohio.

Mansfield, J. P...May 20, 1913
Superintendent, United Natural Gas Company, Van, Pennsylvania.

Marckworth, W. C.....................................May 15, 1917
President and General Manager, Mountain State Gas Company, Union Trust Building, Charleston, West Virginia.

Markley, Joseph C.....................................May 19, 1914
Treasurer, Southwestern Gas & Electric Company, 111 West Monroe Street, Chicago, Illinois.

Marple, M. R..May 16, 1916
Storekeeper, Equitable Gas Company, Twenty-third and Liberty Streets, Pittsburgh, Pennsylvania.

Marquis, H. H..May 15, 1917
Manager, Kane Supply Company, 17 Greeves Street, Kane, Pennsylvania.

Marriott, W. J..May 15, 1917
Foreman, Dominion Natural Gas Company, Limited, Galt, Ontario, Canada.

Marston, Edgar J......................................May 15, 1917
Treasurer, Texas & Pacific Coal Company, New York Office, 24 Broad Street, New York, New York, Thurber, Texas.

Martin, Edward P......................................May 20, 1913
Agent, The East Ohio Gas Company, 124 North Chestnut Street, Ravenna, Ohio.

Martin, F. W..May 16, 1916
Agent, Hope Natural Gas Company, 710 Wells Street, Sistersville, West Virginia.

Martin, Henry...May 15, 1917
Oil Producer, J. W. Leonard Oil Company, 28 South Wade Avenue, Washington, Pennsylvania.

Martin, James...May 20, 1913
Superintendent, No. 2 Works, The East Ohio Gas Company, East Sixty-second Street and L. S. & M. S. R. R., Cleveland, Ohio.

Martin, J. O..May 16, 1916
Contracting Agent, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Martin, John...May 20, 1913
President, Midway Gas Company, 332 Pine Street, Room 411, San Francisco, California.

Mascho, Charles W....................................May 20, 1913
Vice President, The National Supply Company, 136 Huron Street, Toledo, Ohio.

Mason, Alphonso.......................................May 18, 1909
Representative, Welsbach Company, Gloucester City, New Jersey.

Mason, C. F..May 21, 1907
Superintendent, The Western Distributing Company, Sedgwick, Kansas.

Mason, John F..May 20, 1913
Superintendent of Distribution, United Natural Gas Company, 308 Seneca Street, Oil City, Pennsylvania.

Mason, Sidney..May 17, 1910
President, Welsbach Company, 412 United Gas Improvement Building, Broad and Arch Streets, Philadelphia, Pennsylvania.

Matson, J. R..May 20, 1913
Agent, The East Ohio Gas Company, 213 East Grant Street, Dennison, Ohio.

Maxon, Harry R..May 18, 1915
Assistant to General Manager, Central Indiana Gas Company, Muncie, Indiana.

Maxon, John H..May 18, 1909
President and General Manager, The Central Indiana Gas Company, 301 East Main Street, Muncie, Indiana.

May, A. G..May 16, 1916
217 Burris Street, Hamilton, Ontario, Canada,

McAllister, L. P..May 18, 1915
Engineer, Columbia Gas & Electric Company, Branchland, West Virginia.

McBride, R. S..May 16, 1916
Associate Chemist, Bureau of Standards, Washington, District of Columbia.

McCabe, John G..May 16, 1916
Shop Foreman, The Peoples Natural Gas Company, 1919 Forbes Street, Pittsburgh, Pennsylvania.

McCall, Edward P..May 16, 1916
Drilling Contractor, C. W. McCall & Company, Second Street, Weston, West Virginia.

McCalmont, C. P..May 20, 1913
Superintendent, Pennsylvania Gas Company, 213 Second Street, Warren, Pennsylvania.

McCandless, C. H..May 20, 1913
District Manager, United and Globe Rubber Manufacturing Companies, 914 Farmers Bank Building, Pittsburgh, Pennsylvania.

McCandless, H. E..May 15, 1917
Clinton Pipe Pulling Company, 1306 Edward Street, Cleveland, Ohio.

McCandless, Harry M..May 15, 1917
Agent, Clarion Gas Company, Clarion, Pennsylvania.

McCann, G. E..May 15, 1917
Shop and Garage Foreman, Iroquois Natural Gas Company, 486 Massachusetts Avenue, Buffalo, New York.

McCarthy, L. R..May 15, 1917
Superintendent, Oklahoma Natural Gas Company, 1011 North Cheyenne Street, Tulsa, Oklahoma.

McClellan, Arthur,.......................................May 16, 1916
Superintendent of Construction, The Peoples Natural Gas Company, 108 Orchard Street, Woodlawn, Pennsylvania.

McClellan, Joseph.......................................May 16, 1916
Orifice Meter Department, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

McClellan, W. C.......................................May 16, 1916
Shop Foreman, The Peoples Natural Gas Company, Race Street, Manor, Pennsylvania.

McClintock, C. A.......................................May 15, 1917
Division Foreman, The East Ohio Gas Company, St., Clairsville, Ohio.

McClintock, J. T.......................................May 18, 1915
President, Huntington Development & Gas Company, 928 Third Avenue, Huntington, West Virginia.

McCloskey, James P.......................................May 17, 1910
Superintendent, Columbia Gas & Electric Company, Tenth Street and Third Avenue, Huntington, West Virginia.

McCloy, S. D.......................................May 16, 1916
Contractor, Any Company, 323 Ridge Avenue, Cannonsburg, Pennsylvania.

McCloy, W. L.......................................May 16, 1911
General Superintendent, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

McCluney, S. F.......................................May 15, 1917
Chief Production Department, Oklahoma Natural Gas Company, 531 North Cheyenne Street, Tulsa, Oklahoma.

McConnell, H. H.......................................May 16, 1916
Secretary and Treasurer, Pennsylvania Gas Company, 213 Second Avenue, Warren, Pennsylvania.

McCord, J. W.......................................May 18, 1909
Secretary and General Manager, Clintonian Fuel & Oil Company, 511 National Bank of Commerce Building, Columbus, Ohio,

McCormick, Edward P.......................................May 16, 1916
Foreman, Iroquois Natural Gas Company, 37 Church Street, Buffalo, New York.

McCormick, J. H.......................................May 15, 1917
Representative, H. H. Mueller Manufacturing Company, Decatur, Illinois.

McCormick, L. M.......................................May 15, 1917
Foreman, The East Ohio Gas Company, 37 Main Street, Warren, Ohio.

McCrea, R. A.......................................May 16, 1911
Construction Engineer, Pittsburgh Valve, Foundry & Construction Company, Box 1016, Pittsburgh, Pennsylvania.

McCrimmon, J. E.......................................May 15, 1917
Leaser, Dominion Natural Gas Company, Limited, St. Thomas, Ontario, Canada.

McCune, D. B.......................................May 15, 1917
Agent, The Natural Gas Company of West Virginia, 34 Garfield Avenue, Salem, Ohio.

McCune, S. A...May 21, 1912
Field Superintendent, Arkansas Natural Gas Company, Box 94, Shreveport, Louisiana.

McDermott, J. H..May 18, 1915
Vice President, Pentrass Natural Gas Company, Morgantown, West Virginia.

McDonald, Donald..May 20, 1913
Vice President and General Manager, Louisville Gas & Electric Company,, 311 West Chestnut Street, Louisville, Kentucky.

McDowell, C. O..May 15, 1917
Superintendent, Kanawha Manufacturers Gas Company, 502 Shrewsbury Street, Charleston, West Virginia.

McDowell, Jesse Clark..February 27, 1906
President, Dominion Natural Gas Company, 1320 Farmers Bank Building, Pittsburgh, Pennsylvania.

McGilvary, H. J..May 16, 1916
Foreman, Pittsburgh & West Virginia Gas Company, 150 High Street, Weston, West Virginia.

McHenry, M. A..May 15, 1917
Lease Superintendent, Medina Gas & Fuel Company, Wooster, Ohio.

McIntyre, M..May 16, 1916
President and General Manager, Gowanda Natural Gas Company, 28 Main Street, Gowanda, New York.

McKay, C. R..May 18, 1915
Manager, Electrical Department, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

McIlhenny, John D..May 17, 1910
President, Gas Company of Montgomery County (Norristown, Pa.), 1339 Cherry Street, Philadelphia, Pennsylvania.

MeKee, George R..May 16, 1916
Foreman, Consolidated Gas Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

McKee, William..May 17, 1910
Secretary, The Chaplin-Fulton Manufacturing Company, 23-24 Penn Avenue, Pittsburgh, Pennsylvania.

McKenzie, William Hunter..February 27, 1906
General Manager, Wyandotte County Gas Company, Sixth and Main Avenue, Kansas City, Kansas.

McKimmie, J. E..May 15, 1917
Purchasing Agent, Dominion Natural Gas Company, Limited, 842 Marine National Bank Building, Buffalo, New York.

McKinney, C. B..May 15, 1917
Vice President and General Manager, North Texas Gas Company, 405 Gandy Street, Denison, Texas.

McKnight, S. C..May 20, 1913
Agent, The East Ohio Gas Company, Barberton, Ohio.

McMahon, D. P..May 15, 1917
Agent, Iroquois Natural Gas Company, 37 Kenefick Avenue, Buffalo, New York.

McMahon, John..May 20, 1913
Collector, Iroquois Natural Gas Company, 59 Dash Avenue, Buffalo, New York.

McMahon, John P..May 18, 1915
Attorney, The Northwestern Ohio Gas Company, Spitzer Building, Toledo, Ohio.

McMahon, J. F..May 20, 1913
Manager, Valley Natural Gas Company, P. O. Box W, Bakersfield, California.

McMahon, John J..May 20, 1913
Superintendent Main Lines, The East Ohio Gas Company, Canton, Ohio.

McMahon, James W..May 18, 1909
General Manager, The Northwestern Ohio Natural Gas Company, 210-212 Huron Street, Toledo, Ohio.

McMasters, W. C..May 16, 1916
Clerk, Pittsburgh and West Virginia Gas Company, Clarksburg, West Virginia.

McMillan, John..May 20, 1913
Superintendent, The Portsmouth Gas Company, 802 Chillicothe Street, Portsmouth, Ohio.

McMillin, Emerson..May 17, 1910
Chairman, Board of Directors, The American Light & Traction Company, 120 Broadway, New York, New York.

McMunn, J. S..May 16, 1916
District Foreman, Equitable Gas Company, 108 Oakmont Avenue, Oakmont, Pennsylvania.

McNally, J. I..May 18, 1915
Electrolysis Expert, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

McNary, John B..May 18, 1915
Manager, Canadian Meter Company, 88-90 Caroline Street, Hamilton, Ontario, Canada.

McNary, J. F..May 19, 1914
Division Superintendent, Philadelphia Company of West Virginia, Union Bank Building, Clarksburg, West Virginia.

McNary, L. J..May 16, 1916
Foreman, Reserve Gas Company, 343 North River Avenue, Weston, West Virginia.

McPherson, Edwin Allan..May 15, 1917
302 Iroquois Building, Buffalo, New York.

Meals, S. W..May 16, 1911
Division Superintendent, Carnegie Natural Gas Company, 320 Eighth Street, Moundsville, West Virginia.

Mead, Carl D..May 16, 1916
Secretary-Treasurer, The Cadiz Gas Company, 114 North Main Street, Cadiz, Ohio.

Machesney, C. A..May 16, 1916
Engineer, Equitablle Gas Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Meredith, George B..May 16, 1916
Foreman, Hope Natural Gas Company, Smithfield, West Virginia.

Mellon, Porter D..May 20, 1913
Engineer, Calgary Gas Company, Limited, 215 Sixth Avenue, West Calgary, Alberta, Canada.

Merket, Joseph..May 18, 1915
Superintendent, The Texas Company, Natural Gas Department, Box 298, Moran, Texas.

Merrill, Edwin C..May 21, 1912
Manufacturer, 2915 Smallman Street, Pittsburgh, Pennsylvania.

Mettler, Lee B..June 12, 1906
Representative, American Water Heater Company, 217 Title Guaranty Building, St. Louis, Missouri.

Metz, Eugene Jr..June 12, 1906
Representative, Metric Metal Works, 1003 Commerce Building, Kansas City, Missouri.

Meyer, Frank J..May 16, 1916
Superintendent Gas Department, Oklahoma Gas & Electric Company, 12 North Broadway, Oklahoma City, Oklahoma.

Michel, F. M..May 16, 1916
Foreman, United Natural Gas Company, 119 West Weber Avenue, DuBois, Pennsylvania.

Mickley, M. A..May 18, 1909
Agent, The Marion Gas Company, 238 East Center Street, Marion, Ohio.

Miller, Alten S..May 21, 1912
Vice President, Humphreys & Miller, Inc., 165 Broadway, New York, New York.

Miller, B. L..May 18, 1915
United Natural Gas Company, Tidioute, Pennsylvania.

Miller, Carroll..May 21, 1912
General Manager, Western United Gas & Electric Company, 36 Lincoln Way, Aurora, Illinois.

Miller, D. F..May 15, 1917
Superintendent, Edgar M. Moore & Company, 709 Farmers Bank Building, Pittsburgh, Pennsylvania.

Miller, E. S..May 21, 1912
Superintendent Gas Department, Kansas Gas & Electric Company, 239 South Main Street, Wichita, Kansas.

Miller, Fred A..May 19, 1909
President and General Manager, S. R. Dresser Mfg. Company, 54 Boyeston Street, Bradford, Pennsylvania.

Miller, H. G..May 18, 1915
Agent, The Granville Fuel & Light Company, P. O. Box 473, Granville, Ohio.

Miller, J. A. W..May 15, 1917
Assistant Superintendent, Pittsburgh, Plate Glass Company, Ford City, Pennsylvania.

Miller, L. L..May 16, 1916
Foreman, Fayette County Gas Company, Walnut Street, Uniontown, Pennsylvania.

Miller, R. R..May 16, 1916
Chief Clerk, Allegheny Heating Company, 603 West Diamond Street, North Side, Pittsburgh, Pennsylvania.

Miller, William A......................................May 18, 1909
Engineer, National Chamber Oven Company, Cincinnati, Ohio.

Milne, D. S......................................May 18, 1915
Manager, Central Indiana Gas Company, Adams and Fifth Streets, Marion, Indiana.

Milne, W. E......................................May 18, 1915
Manager, Gainesville Gas & Electric Company, 12 South Rusk Street, Gainesville, Texas.

Miner, Fred W......................................May 18, 1909
Representative, The National Supply Company, 1306 Union Bank Building, Pittsburgh, Pennsylvania.

Mitchell, C. S......................................May 16, 1911
Controller, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Mitchell, J. Wylie......................................May 18, 1915
Superintendent of Distribution, St. Joseph Gas Company, 802 Francis Street, St. Joseph, Missouri.

Moeller, William, Jr......................................May 19, 1908
Chief Engineer, Midway Gas Company, P. O. Box N, Taft, California.

Montgomery, J. H......................................May 18, 1915
The Natural Gas Company of West Virginia, 96 Garfield Avenue, Salem, Ohio.

Montgomery, M. D......................................May 15, 1917
Foreman, Ingersoll Gas Light Company, Limited, Ingersoll, Ontario, Canada.

Moore, Calvin T......................................May 15, 1917
Geologist, Henry L. Doherty & Company, Box 35, Winchester, Kentucky.

Moore, Edgar M......................................May 18, 1915
Edgar M. Moore & Company, 809-810 Farmers Bank Building, Pittsburgh, Pennsylvania.

Moore, Lee C......................................May 16, 1911
President, Lee C. Moore & Company, 313 Sixth Avenue, Pittsburgh, Pennsylvania.

Moran, P. A......................................May 16, 1916
District Foreman, Equitable Gas Company, 17th and Wharton Streets, Pittsburgh, Pennsylvania.

Morgan, W. J......................................May 16, 1911
Agent, East Ohio Gas Company, 404 Tuscarawas Street, West Canton, Ohio.

Morris, Henry C......................................May 17, 1910
General Manager, The Dallas Gas Company, 1715 Commerce Street, Dallas, Texas.

Morse, Nathan L......................................May 16, 1916
Purchasing Agent, Southern California Gas Company, 740 South Broadway, Los Angeles, California.

Mowry, John......................................May 16, 1916
Foreman, Hope Natural Gas Company, Clay Street, Clarksburg, West Virginia.

Mueller, Fred B......................................June 12, 1906
Vice President, H. Mueller Manufacturing Company, Decatur, Illinois.

Mulkin, P. L......May 20, 1913
Agent, United Natural Gas Company, Oil City, Pennsylvania.

Munce, John Russell......May 16, 1911
Vice President and General Manager, Arkansas Natural Gas Company, 1115 State Bank Building, Little Rock, Arkansas.

Munro, Robert......June 12, 1906
Vice President and General Manager, Century Stove and Manufacturing Company, Dupont Place and Park Avenue, Johnstown, Pennsylvania.

Munro, W. Lorne......May 16, 1916
Auditor, Dominion Natural Gas Company, Main Street, Buffalo, New York.

Murray, John J......May 16, 1911
Superintendent City Division, Equitable Gas Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Murray, M. J......May 15, 1917
Foreman, East Ohio Gas Company, 503 East 127th Street, Cleveland, Ohio.

Murphy, S. F......May 16, 1916
Foreman, United Natural Gas Company, Halsey, Mt. Jewett P. O., Pennsylvania.

Murtaugh, James......May 16, 1916
Field Superintendent, Ohio Fuel Supply Company, 760 East Main Street, Lancaster, Ohio.

Myers, E. E......May 16, 1916
Agent, The Peoples Natural Gas Company, New Kensington, Pennsylvania.

Nash, John J......May 18, 1915
General Manager, Huntington Development & Gas Company, 1428 Seventh Avenue, Huntington, West Virginia.

Nash, Raymond J......May 16, 1916
Foreman, Huntington Development & Gas Company, 928 Third Avenue, Huntington, West Virginia.

Near, C. J......May 15, 1917
Foreman, The Union Natural Gas Company, Essex, Ontario, Canada.

Near, W. W......May 19, 1914
President, Page-Hersey Iron, Tube & Land Company, Limited, 6603 Dominion Bank Building, Toronto, Ontario, Canada.

Neely, Ira L......May 16, 1916
Superintendent, The Medina Gas & Fuel Company, Wooster, Ohio.

Neely, Lemon G......May 18, 1909
President, The Berea Pipe Line Company, Saint Marys, Ohio.

Nelson, H. E......May 15, 1917
Engineer, Manufacturers Gas Company, Erdice, Jefferson County, Pennsylvania.

Nestor, J. F......May 16, 1916
Chief Engineer, Manufacturers Light & Heat Company, 1417 Chaplin Street, Wheeling, West Virginia.

Nestor, W. E......May 20, 1913
Engineer, Manufacturers Light & Heat Company, Waynesburg, Pennsylvania.

Newhouse, B. Frank..................................May 16, 1916
Service Clerk, Union Gas & Electric Company, Southwest Corner Fourth and Plum Streets, Cincinnati, Ohio.

Newman, A. J..................................May 16, 1916
General Auditor, Union Natural Gas Corporation, Union Bank Building, Pittsburgh, Pennsylvania.

Newton, M. A..................................May 16, 1916
Industrial Engineer, Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Newton, Nelson A..................................May 18, 1915
Efficiency Engineer, The Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Nickerson, Henry B..................................May 15, 1917
Secretary, American Steam Gauge & Valve Mfg. Company, 208-220 Camden Street (Mail Address, Box 128, Back Bay P. O. Boston, Massachusetts), Boston, Massachusetts.

Nicoll, Thomas..................................May 19, 1914
Treasurer, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Nicholson, French..................................May 16, 1916
Foreman, Hope Natural Gas Company, Bridgeport, West Virginia.

Nole, E. P..................................May 16, 1916
Field Foreman, The Peoples Natural Gas Company, Belle Vernon, Pennsylvania.

Norris, Henry S..................................May 20, 1913
Secretary, Iroquois Natural Gas Company, Iroquois Building, Buffalo, New York.

Norris, Rollin..................................May 21, 1907
Superintendent of Works, United Gas Improvement Company, Broad and Arch Streets, Philadelphia, Pennsylvania.

Northcott, G. A..................................May 18, 1915
Treasurer, Huntington, Development & Gas Company, 928 Third Avenue, Huntington, West Virginia.

Northup, Charles S..................................May 17, 1915
Attorney, The Northwestern Ohio Natural Gas Company, Spitzer Building, Toledo, Ohio.

Norton, Charles L..................................May 20, 1913
Manager, George C. Moon Company, Inc., 486 The Arcade, Cleveland, Ohio.

Nutt, E. Burt..................................May 16, 1916
Auditor, East Ohio Gas Company, East Ohio Gas Building, 1405 East Sixth Street, Cleveland, Ohio.

Oakes, W. L..................................May 20, 1913
Chief Teller, The East Ohio Gas Company, 1405 East Sixth Avenue, Cleveland, Ohio.

Oberfell, George G..................................May 16, 1916
Chemist, Ohio Fuel Supply Company, Homer, Ohio.

O'Brien, Thomas F..................................May 16, 1916
Agent, United Fuel Gas Company, Church Street, Spencer, West Virginia.

O'Brian, T. F..May 19, 1914
Superintendent, The Texas Company, Natural Gas Department, Drawer 44, Shreveport, Louisiana.

O'Brien, William..May 19, 1914
President, O'Brien Steel Construction Company, Washington, Pennsylvania.

O'Conner T. M..May 20 1913
Foreman, The East Ohio Gas Company, 6411 Central Avenue, Cleveland, Ohio.

O'Day, John J..May 16, 1916
Agent, The Manufacturers Light & Heat Company, Coraopolis, Pennsylvania.

Odenkirk, H. B..May 16, 1916
Developer of Oil and Gas, East Liberty Street, Wooster, Ohio.

O'Donnell, John L..May 19, 1908
The Hanna Oil Company, Tulsa, Oklahoma.

O'Leary, Dennis..May 20, 1913
Chief Engineer, Pennsylvania Gas Company, Lodlow, Pennsylvania.

Oliphant, Bert C..May 21, 1912
President, Iroquois Natural Gas Company, 37 Church Street, Buffalo, New York.

Oliphant, F. H..May 15, 1917
Assistant Engineer, Iroquois Natural Gas Company, 812 Auburn Avenue, Buffalo, New York.

Olmstead, J. F..May 16, 1916
Superintendent of Distribution, Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Oliver, C. E..May 20, 1913
Chief, Pressure Department, United Natural Gas Company, 206 Seneca Street, Oil City, Pennsylvania.

Olney, George L..............6........................May 15, 1917
Superintendent Building Construction, The East Ohio Gas Company, 1405 East Sixth Street, Cleveland, Ohio.

O'Neill, Charles..May 21, 1907
Superintendent of Distribution, Webb City & Carterville Gas Company, Carthage Gas Company, Webb City, Missouri.

Ossenbeck, Fred J..May 21, 1912
Secretary-Treasurer, The Ardizzone Company, 507-508 Bliss Building, Tulsa, Oklahoma.

Ostermaier, John..May 16, 1916
District Foreman, Equitable Gas Company, 23rd Street and Liberty Avenue, Pittsburgh, Pennsylvania.

Ostrye, Peter L..May 16, 1916
Superintendent, Meter Department, East Ohio Gas Company, Hendon Avenue, West Park, Cleveland, Ohio.

Painter, Jay C..May 15, 1917
Cashier, Oklahoma Natural Gas Company, Pioneer Building, Tulsa, Oklahoma.

Palm, C. J..May 16, 1916
Superintendent, Lease Department, Logan Natural Gas Company, 34 Ruggery Building, Columbus, Ohio.

Palmer, J. F. ....May 16, 1916
General Superintendent, Arkansas Natural Gas Company, 2745 Fairfield Avenue, Shreveport, Louisiana.

Palmer, W. M ....May 18, 1915
District Superintendent, Caddo Division, Southwestern Gas & Electric Company, 116 Texas Street, Shreveport, Louisiana.

Paris, A. J. Jr ....May 16, 1916
Treasurer and General Manager, Felt Gas Compressing Company, Bradford, Pennsylvania.

Parker, John F ....June 12, 1906
Sales Manager, Eclipse Gas Stove Company, 707 South Main Street, Rockford, Illinois.

Parks, R. N ....May 18, 1915
Gasoline and Meter Engineer, United Fuel Gas Company, Quarrier Street, Charleston, West Virginia.

Parr, Adrian T ....May 15, 1917
Safety Inspector, Henry L. Doherty & Company, 428 North Bever Street, Wooster, Ohio.

Patterson, A. B ....May 19, 1914
Manager, New York Belting Packing Company, 420 First Avenue, Pittsburgh, Pennsylvania.

Patterson, William M ....May 18, 1909
In Charge of Pipe Department, Frick Lindsay Company, 109 Wood Street, Pittsburgh, Pennsylvania.

Pattinson, R. L ....May 19, 1914
President, Medina Natural Gas Company, 29 Fifth Street, Chatham, Ontario, Canada.

Payne, A. I ....May 21, 1912
Consulting Gas Engineer, P. O. Box 571, Calgary, Alberta, Canada.

Payne, Christy ....May 18, 1915
Attorney and Secretary, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Payne, Francis H ....May 20, 1913
Manager, Metric Metal Works, Post Office Box 710, Erie, Pennsylvania.

Pearson, C. A ....May 15, 1917
Master Mechanic, United Natural Gas Company, Oil City, Pennsylvania.

Pearson, H. B ....May 19, 1914
General Superintendent, The Canadian Western Natural Gas, Light, Heat & Power Company, Limited, 215 Sixth Avenue, West, Calgary, Alberta, Canada.

Peddicord, T. B ....May 19, 1915
Foreman, Pittsburgh & West Virginia Gas Company, 382 Broaddus Avenue, Clarksburg, West Virginia.

Penhale, J. W ....May 18, 1915
Superintendent, United Fuel Gas Company, Quarrier Street, Charleston, West Virginia.

Perdue, J. L ....May 16, 1916
Superintendent, Compressing Department, United Fuel Gas Company, Charleston, West Virginia.

Perry, E. R..May 15, 1917
Cosden Oil & Gas Company, Tulsa, Oklahoma.

Perry, J. S...May 16, 1916
Gas Producer, Brighton Hotel, Washington, D. C.

Pew, James G..May 16, 1916
Superintendent, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Pew, John G..May 20, 1913
President, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Phillips, C. C..May 18, 1915
Chief Clerk, Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Phillips, D. H..May 15, 1917
Agent, Potter Gas Company, Port Allegheny, Pennsylvania.

Phillips, Henry T..May 16, 1916
Gas Magazine, Service Publishing Company, 179 East Long Street, Columbus, Ohio.

Pick, Earle..May 16, 1916
Agent, The Peoples Natural Gas Company, 448 Walnut Avenue, Greensburg, Pennsylvania.

Plagenz, George W..May 18, 1915
Secretary to Secretary-Treasurer, The East Ohio Gas Company, 1405 East Sixth Street, Cleveland, Ohio.

Poole, C. J..May 16, 1916
Agent, Fayette County Gas Company, 302 South Pittsburgh Street, Connellsville, Pennsylvania.

Pope, Worden..May 16, 1916
Engineer, Henry L. Doherty & Company, 60 Wall Street, New York, New York.

Porterfield, Harry..May 16 1916
Shop Foreman, The Peoples Natural Gas Company, 707 Center Street, Wilkinsburg, Pennsylvania.

Porterfield, R. M..May 16, 1916
Inspector, Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Powers, Nicholas..May 16, 1916
Oil and Gas Well Contractor, Powers Brothers, Fairmont, West Virginia.

Pratt, Charles E..May 16, 1916
Foreman, Equitable Gas Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Pratt, Edward G..May 21, 1912
Consulting and Managing Gas Engineer, 122 South Michigan Avenue, Chicago, Illinois.

Presho, A. A..May 15, 1917
Agent, Potter Gas Company, Westfield, Pennsylvania.

President ....May 18, 1915
Direccion General Explotacion del Petroleo de Comodore Rivadava, 278 Balcarce, Buenos Aires, Argentine.

Preston, S. C.......................................May 16, 1916
Chief Engineer, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Price, W. W.......................................May 18, 1909
President, Dayton Pipe Coupling Company, Edmun Street, Dayton, Ohio.

Prior, Charles J.......................................May 20, 1913
Assistant to Manager, Metric Metal Works, 339 East 7th Street, Erie, Pennsylvania.

Prill, H. M.......................................May 15, 1917
Cashier, Warren & Chautauqua Gas Company, 235 Pennsylvania Avenue, West, Warren, Pennsylvania.

Pringle, R. S.......................................May 15, 1917
Manager, Pringle Powder Company, 139 Main Street, Bradford, Pennsylvania.

Pryor, F. B.......................................May 16, 1911
Secretary, Fairmont Gas and Light Company, Jefferson Street, Fairmont, West Virginia.

Purdy, J. S. L.......................................May 19, 1914
General Manager, The Pavillion Natural Gas Company, 68 Main Street, LeRoy, New York.

Pyzel, E. D.......................................May 17, 1910
Gas Engineer, Heerengracht 141-145, Amsterdam, Holland.

Quay, H. A.......................................May 18, 1915
District Manager, Manufacturers Light & Heat Company, Columbia Bank Building, Pittsburgh, Pennsylvania.

Quinlan, P. J.......................................May 16, 1916
Shop Foreman, The River Gas Company, 228 Third Street Marietta, Ohio.

Quinlin, Ambrose J.......................................May 20, 1913
General Foreman, The East Ohio Gas Company, 1405 East Sixth Street, Cleveland, Ohio.

Rae, A. B.......................................May 20, 1913
Foreman, The East Ohio Gas Company, 4706 Lorain Avenue, Cleveland, Ohio.

Ralph, Charles A.......................................May 18, 1915
Ralph Brothers, Aspinwall, Pennsylvania.

Ralston, William S.......................................May 18, 1909
Vice-President, Chaplin-Fulton Manufacturing Company, 34 Penn Avenue, Pittsburgh, Pennsylvania.

Ramage, J. R.......................................May 16, 1916
Gas Salesman, Louisville Gas & Electric Company, 311 West Chestnut Street, Louisville, Kentucky.

Ramsey, E. C.......................................May 15, 1917
Engineer in Charge of Field Pressure, Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Randolph, Ernest.......................................May 19, 1914
Oil and Gas Operator, 510 Goff Building, Clarksburg, West Virginia.

Randolph, M. D.......................................May 16, 1916
Manager, Arkansas Natural Gas Company, Pine Bluff, Arkansas.

Rankin, Harvey .... May 16, 1916
Head Leaseman, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Ratcliffe, George L .... May 16, 1916
Agent, The Peoples Natural Gas Company, Woodlawn, Pennsylvania.

Ratcliffe, George W .... May 21, 1912
Treasurer, Manufacturers Light & Heat Company, 248 Fourth Avenue, Pittsburgh, Pennsylvania.

Reckard, G. H .... May 16, 1916
Purchasing Agent, The Miller Supply Company, Huntington, West Virginia.

Redic, Samuel .... May 16, 1911
Representative, Spang & Company, Butler, Pennsylvania.

Reed, Charles G .... May 16, 1916
Construction Engineer, Hope Natural Gas Company, Despard Clarksburg, West Virginia.

Reed, F. L .... May 16, 1916
Agent, The River Gas Company, 324 Fourth Street, Marietta, Ohio.

Reed, Ira B .... May 15, 1917
Assistant Secretary and Treasurer, Iroquois Natural Gas Company, 214 Hoyt Street, Buffalo, New York.

Reed, J. A .... May 16, 1911
Assistant General Superintendent, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Reed, James H .... May 16, 1916
President, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Reed, J. H. Jr .... May 16, 1911
General Purchasing Agent, Philadelphia, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Reed, N. W .... May 16, 1916
Agent, Clarion Gas Company, 513 Main Street, Clarion, Pennsylvania.

Reel, W. G .... May 16, 1916
Contractor, Oil and Gas Wells, Kenyon Avenue, West View, Pittsburgh, Pennsylvania.

Reeser, E. B .... May 20, 1913
General Manager, Potter Gas Company, Farmers Bank Building, Pittsburgh, Pennsylvania.

Reeser, F. B .... May 18, 1915
The Miami Valley Gas & Fuel Company, Piqua, Ohio.

Reeser, Harry C .... May 17, 1910
Assistant to the President, Ohio Fuel Supply Company, 2017 Farmers Bank Building, Pittsburgh, Pennsylvania.

Reeser, J. W .... May 19, 1914
General Superintendent, United Fuel Gas Company, 517 Sixth Street, Huntington, West Virginia.

Reichel, C. D .... May 20, 1913
Information and Complaint Clerk, The Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Reichert, Win .... May 16, 1916
Shop Foreman, The Peoples Natural Gas Company, Wilkinsburg, Pennsylvania.

Reiley, D. M .... May 15, 1917
Charge of Display Room, Iroquois Natural Gas Company, 548 North Elmwood Avenue, Buffalo, New York.

Reiser, Charles L .... May 15, 1917
Station Engineer, Iroquois Natural Gas Company, Collins Center, New York.

Remler, J. E .... May 15, 1917
Superintendent, Compressor Station, Kansas Gas Company, Independence, Kansas.

Renick, J. D .... May 16, 1916
Inspector, Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Reul, William H .... May 20, 1913
Superintendent Fitting Department, The Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Reynolds, H. C .... May 17, 1910
Sole Owner, Reynolds Gas Regulator Company, 1019 Delaware Street, Anderson, Indiana.

Rich, A. R .... May 18, 1915
Superintendent, The Ohio Cities Gas Company, West Virginia Division, Dawes, Kanawha County, West Virginia.

Rich, Edward B .... May 16, 1911
President, University Oil Company, P. O. Box 628, Parkersburg, West Virginia.

Rich, Fred S .... May 18, 1915
President, Crude Oil Company, Oil City, Pennsylvania.

Richards, W. H .... May 16, 1916
Treasurer, Potter Gas Company, Port Allegheny, Pennsylvania.

Richie, J. A .... May 15, 1917
Secretary-Treasurer, Dominion Natural Gas Company, Limited, 842 Marine Bank Building, Buffalo, New York.

Richter, William F .... May 16, 1916
Foreman, Fayette County Gas Company, Painter Street, South McConnellsville, Pennsylvania.

Riddle, George B .... May 18, 1915
Superintendent, The Natural Gas Company of West Virginia, 1226 Chaplin Street, Wheeling, West Virginia.

Ridgway, J. L .... May 16, 1916
Field Foreman, The Peoples Natural Gas Company, Brave, Pennsylvania.

Riggs, D. B .... May 18, 1915
Foreman, Ohio Fuel Supply Company, 736 Fountain Square, Zanesville, Ohio.

Riggs, Ross .... May 19, 1914
Field Foreman, Northeastern Oil & Gas Company, R. D. No. 1, Jefferson, Ohio.

Riley, George N .... May 16, 1911
Engineer, National Tube Company, Frick Building, Pittsburgh, Pennsylvania.

Ripley, L. O..May 21, 1912
Vice President and General Manager, Kansas Gas & Electric Company, 237-239 South Main Street, Wichita, Kansas.

Roberts, C. C..May 16, 1916
Superintendent, Southern Ontario Gas Company, 41 Queen Street, St. Thomas, Ontario, Canada.

Roberts, M. J..May 15, 1917
Meter Tester, Beaver Oil & Gas Company, Limited, Kingsville, Ontario, Canada.

Roberts, W. T..May 16, 1916
Inspector, Arkansas Natural Gas Company, Little Rock, Arkansas.

Robertson, D..May 16, 1916
Treasurer, Pittsburgh Oil & Gas Company, 1005 Farmers Bank Building, Pittsburgh, Pennsylvania.

Robertson, D. S..May 16, 1916
Superintendent, Jantha Light & Fuel Company, Greenville, Ohio.

Robertson, John D..May 21, 1912
Owner and Producer, Jacksonville, Illinois.

Robertson, W. A..May 15, 1917
Field Man, Clear Creek Oil & Gas Company, 400 Garrison Avenue, Ft. Smith, Arkansas.

Robinson, Edwin..May 18, 1915
Secretary-Treasurer, West Virginia Natural Gas Association, Jacobs Building, Fairmont, West Virginia.

Robinson, E. Jr..May 20, 1913
Superintendent Supplies, Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Robinson, L. E..May 21, 1912
General Manager, The Robinson Packer and Machine Company, 141 Spruce Street, Coffeyville, Kansas.

Roby, H. P..May 15, 1917
Assistant Secretary-Treasurer, Interstate Pipe Company, 1523 Oliver Building, Pittsburgh, Pennsylvania.

Rockwell, C. O..May 20, 1913
Superintendent, The Ohio Fuel Supply Company, 207 East Burgess Street, Mt. Vernon, Ohio.

Rodgers, Edward H..May 19, 1908
President, Standard Meter Company, 3112 North 17th Street, Philadelphia, Pennsylvania.

Rogers, Homer R..May 18, 1909
Agent, The Logan Natural Gas & Fuel Company, Tiffin, Ohio.

Rogers, W. J..May 16, 1916
General Solicitor, Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Romano, M..May 16, 1916
Labor Supplied for Gas Companies, 119 Shetland Avenue, E. E., Pittsburgh, Pennsylvania.

Rooney, E. S..May 18, 1909
District Sales Agent, The Youngstown Sheet & Tube Company, 1626 Oliver Building, Pittsburgh, Pennsylvania.

Rose, W. J. .... May 20, 1913
Manager, Alliance Gas & Power Company, Alliance, Ohio.

Rothert, E. R .... May 18, 1915
Solicitor, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Rowan, Raymond C .... May 15, 1917
Secretary to Vice President, The Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Rowland, Willard J .... May 16, 1911
President, Creek County Gas Company, 1913 First National Bank Building, Pittsburgh, Pennsylvania.

Rudert, Emil .... May 15, 1917
Contractor, Saxonburg, Pennsylvania.

Rumbaugh, G. N .... May 16, 1916
229 South Poplar Street, Wichita, Kansas.

Rupp, C. H .... May 18, 1916
Assistant Treasurer, The Peoples Natural Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Rush, Albert .... May 15, 1917
Contractor, Manufacturers Light & Heat Company, Waynesburg, Pennsylvania.

Russell, C. H .... May 15, 1917
Chief Station Engineer, United Gas Company, R. F. D. No. 1, Mt. Jewett, Pennsylvania.

Russell, G. W .... May 18, 1915
Superintendent, Ardmore City Gas Company, 220 West Main Street, Ardmore, Oklahoma.

Russum, R. C .... May 15, 1917
Secretary-Treasurer, Quapaw Gas Company, 1st National Bank Building, Bartlesville, Oklahoma.

Rutz, A. O .... May 16, 1916
General Manager, Milwaukee Gas Specialty Company, 133 Second Street, Milwaukee, Wisconsin.

Ryan, E. M .... May 15, 1917
Chief Gas Ledger Bookkeeper, Iroquois Natural Gas Company, 185 Hamburg Street, Buffalo, New York.

Ryan, J. L .... May 15, 1917
Agent, Salamanca, New York, Iroquois Natural Gas Company, Salamanca, New York.

Ryan, W. G .... May 16, 1916
Oil and Gas Producer, 322 Wellington Street, Chatham, Ontario, Canada.

Sackett, Edward .... May 16, 1916
Meter Engineer, United Fuel Gas Company, Quarrier Street, Charleston, West Virginia.

Saeger, E. L .... May 15, 1917
Foreman, East Ohio Gas Company, Barberton, Ohio.

Sands, Louis I .... May 18, 1909
Vice President, The Oil Well Supply Company, 215 Water Street, Pittsburgh, Pennsylvania.

Sarchet, A. C .... May 16, 1911
Agent, The Ohio Fuel Supply Company, 142 North 9th Street, Cambridge, Ohio.

Sargent, R. N...May 15, 1917
Works Manager, The Roessler & Hasslacher Chemical Company, St. Albans, West Virginia.

Sartorius, F...May 15, 1917
Treasurer, United Natural Gas Company, 308 Seneca Street, Oil City, Pennsylvania.

Saul, Milt..May 18, 1915
Editor, Gas Record, Monadnock Block, Chicago, Illinois.

de Saulles, C. A. H...May 19, 1908
American Smelting and Refining Company, 165 Broadway, New York, New York.

Schaffer, Hose..May 16, 1916
Foreman, The Manufacturers Light & Heat Company, Washington, Pennsylvania.

Schalek, John H...May 16, 1916
Meter Tester and Repairman, Manufacturers Light & Heat Company, Millbridge and Manton Streets, Pittsburgh, Pennsylvania.

Schall, Henry D...May 17, 1910
Assistant to Vice-President, Detroit Stove Works, 1320-60 Jefferson Avenue, Detroit, Michigan.

Schatzel, G. P...May 16, 1916
Agent, Logan Natural Gas & Fuel Company, 114 West Front Street, Findlay, Ohio.

Schauer, Frank F...May 21, 1912
Assistant Engineer, Kansas City, Gas Company, 910 Grand Avenue, Kansas City, Missouri.

Schell, George W...May 17, 1910
Mayerstown, Leb. County, Pennsylvania.

Schell, W. F...May 18, 1915
Mechanical Engineer, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Schlaudecker, E. M...May 20, 1913
Agent, Pennsylvania Gas Company, 312-314 Cherry Street, Jamestown, New York.

Schlosser, A. J...May 16, 1916
Chief Engineer, Station Department, Potter Gas Company, Box 237, Shinglehouse, Pennsylvania.

Schmidt, Elmer F...May 18, 1915
Assistant Engineer, The Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Schneider, M. C...May 19, 1914
Assistant to General Superintendent, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Schwarm, C. A...May 21, 1907
General Manager, Corpus Christi Gas Company, Corpus Chrisiti, Texas.

Scott, G. C...May 18, 1909
Secretary-Treasurer, The Columbus Gas & Fuel Company, 135 North Front Street, Columbus, Ohio.

Scott, John Milton..May 18, 1909
Secretary and Treasurer, Kansas City Gas Company, 910 Grand Avenue, Kansas City, Missouri.

Scott, W. H.......................................May 16, 1911
Teller, The North-Western Ohio Natural Gas Company, 210-212 Huron Street, Toledo, Ohio.

Scoville, James......................................May 15, 1917
Foreman, The East Ohio Gas Company, 19-21 North High Street, Akron, Ohio.

Scratch, George......................................May 15, 1917
Foreman, Beaver Oil & Gas Company, Limited, Kingsville, Ontario, Canada.

Searle, Robert Meredith..............................May 21, 1912
Vice-President, Rochester Railway & Light Company, 34 Clinton Avenue, North, Rochester, New York.

Secrest, M. F......................................May 16, 1916
Foreman, Arkansas Natural Gas Company, Hope, Arkansas.

Sedberry, W. H......................................May 16, 1911
Manager, Marshall Gas Company and Louisiana-Texas Natural Gas Company, Rusk and Bolivar Streets, Marshall, Texas.

Seeger, Robert......................................May 21, 1907
District Manager, Welsbach Street Lighting Company of America, 704 Laclede Gas Building, Saint Louis, Missouri.

Seep, Joseph......................................May 15, 1917
President, Central Kentucky National Gas Company, Oil City, Pennsylvania.

Seibel, John......................................May 16, 1911
Night Watchman, Logan Natural Gas & Fuel Company, 612 North Cory Street, Findlay, Ohio.

Seyffert, L. A.......................................May 20 , 1913
Treasurer, United Fuel Gas Company, Box 1256, Charleston, West Virginia.

Shade, R. S.......................................May 19, 1914
Assistant Superintendent Main Lines and Distribution, Kansas Naturarl Gas Company, 201 Second Street, Independence, Kansas.

Shafer, F......................................May 15, 1917
Superintendent, Southern California Gas Company, Garland Building, Los Angeles, California.

Shaffer, D. C.......................................May 18, 1915
Superintendent Distribution, Union Light, Heat & Power Company, Court and Park Place, Covington, Kentucky.

Shannon, Ogden K.......................................May 17, 1910
Manager, The Fort Worth Gas Company, Eleventh and Throckmorton Street, Fort Worth, Texas.

Shattuck, Jay R.......................................May 15, 1917
Chief Clerk, Chart Department, Iroquois Natural Gas Company, 205 Carolina Street, Buffalo, New York.

Shaw, S. T.......................................May 16, 1916
Agent, The Peoples Natural Gas Company, 343 Main Street, Latrobe, Pennsylvania.

Shay, J. W.......................................May 16, 1916
President, Greensboro Gas Company, 248 Fourth Avenue, Pittsburgh, Pennsylvania.

Shear, Robert......................................May 16, 1911
Secretary, Home Gas Company, Mt. Morris, Pennsylvania.

Sheets, William L......................................May 16, 1916
Clerk, Pittsburgh & West Virginia Gas Company, 608 West Center Street, Weston, West Virginia.

Shenker, A. B..May 15, 1917
Moving Contractor, Shenker & Shenker, West Park, Ohio.

Sheppard, John C......................................May 16, 1911
Superintendent, Chaplin-Fulton Manufacturing Company, 28-34 Penn Avenue, Pittsburgh, Pennsylvania.

Shepard, W. H..May 19, 1908
Treasurer and Manager, Coffeyville Gas & Fuel Company, 112 West Eighth Street, Coffeyville, Kansas.

Sherlock, Amy (Miss)..................................May 20, 1913
Assistant Secretary, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Shiebler, Marvin.......................................May 17, 1910
Consulting Gas Engineer, 80 Broadway, New York, New York.

Shinnick, George S....................................May 16, 1916
Commercial Manager, Columbus Gas & Fuel Company, 135 North Front Street, Columbus, Ohio.

Short, C. L...May 15, 1917
Superintendent, Boone Territory, Mountain State Gas Company, P. O. Box "P," Peytona, West Virginia.

Shoub, John F..May 20, 1913
Secretary, The Delaware Gas Company, 68 North Sandusky Street, Delaware, Ohio.

Shriver, Ed...May 15, 1917
Foreman, East Ohio Gas Company, 127 North Chestnut Street, Ravenna, Ohio.

Shulters, Hoyt V.......................................May 21, 1912
Secretary and Treasurer, The East Ohio Gas Company, 1405 East Sixth Street, Cleveland, Ohio.

Silliman, L. R..May 16, 1916
District Foreman, Equitable Gas Company, Tarentum, Pennsylvania.

Silva, Albert..May 18, 1915
Secretary-Treasurer, The Union Light, Heat & Power Company, Covington, Kentucky.

Simmons, L. M..May 20, 1913
Agent, United Natural Gas Company, Du Bois, Pennsylvania.

Simmons, W. P..May 16, 1916
Agent, The Manufacturers Light & Heat Company, 61 East Wheeling Street, Washington, Pennsylvania.

Simpson, J. M...May 18, 1915
Assistant Purchasing Agent, The Ohio Fuel Supply Company, 2017 Farmers Bank Building, Pittsburgh, Pennsylvania.

Sinclair, E. W...May 21, 1907
President, Exchange National Bank, Tulsa, Oklahoma.

Singleton, Bert..May 16, 1916
Foreman, Hope Natural Gas Company, 310 Dancer Street, Clarksburg, West Virginia.

Sipe, George B...May 19, 1908
Vice President and General Manager, Louisiana Gas Company, Levy Building, Shreveport, Louisiana.

Sipe, William Everett..................................May 16, 1911
Manager, Atlanta Gas Company, Atlanta, Texas.

Siverling, J. L...May 16, 1916
Field Foreman, The Peoples Natural Gas Company, Elderton, Pennsylvania.

Slack, Charles W.......................................May 15, 1917
Superintendent, The Attica Natural Gas Company, Attica, New York.

Sladen, H. S...May 16, 1911
Wichita Manager, Kansas Gas & Electric Company, 237 South Main Street, Wichita, Kansas.

Sloan, C. M...May 15, 1917
Clerk, Shop, Iroquois Natural Gas Company, 108 Eighteenth Street, Buffalo, New York.

Sloan, C. T...May 15, 1917
Assistant Engineer, Iroquois Natural Gas Company, Quaker Street, Orchard Park, New York.

Sloan, F. M...May 16, 1916
Operator, Murraysville, Pennsylvania.

Sloan, J. A...May 16, 1916
Shop Foreman, The Peoples Natural Gas Company, Portage. Pennsylvania.

Sloan, W. L...May 15, 1917
Foreman, Station Men, Iroquois Natural Gas Company, 81 Buffom Street, Buffalo, New York.

Sloane, P. C....May 16, 1916
Agent, United Fuel Gas Company, Quarrier Street, Charleston, West Virginia.

Slogle, B...May 15, 1917
Oil and Gas Producer, Care Continental Supply Company, West Park, Ohio.

Smies, George H...May 20, 1913
Chief Clerk, The Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Smith, A. C...May 16, 1916
Operator, 507 Virginia Street, Charleston, West Virginia.

Smith, Elmer A..May 16, 1916
Auditor, American Natural Gas Company, 1511 Park Building, Pittsburgh, Pennslyvania.

Smith, Ernest B...May 18, 1909
Manager, The Coshocton Gas Company, Bachert Building, Coshocton, Ohio.

Smith, Edward...May 18, 1915
Chief Clerk, Well Accounting Department, The East Ohio Gas Company, 1513 Lincoln Avenue, Lakewood, Ohio.

Smith, Frank D..May 15, 1917
Agent, Iroquois Natural Gas Company, Springville, New York.

Smith, H. L...May 16, 1916
Auditor, Carnegie Natural Gas Company, 922 Carnegie Building, Pittsburgh, Pennsylvania.

Smith, H. L...May 16, 1916
District Foreman, Equitable Gas Company, 147 East Fifth Avenue, Homestead, Pennsylvania.

Smith, Frank N...May 18, 1915
Pattern Superintendent, S. R. Dresser Mfg. Company, 17 Davis Street, Bradford, Pennsylvania.

Smith, W. T...May 16, 1916
Foreman, Hope Natural Gas Company, 304 Clarksburg Street, Mannington, West Virginia.

Snoke, Alpheus...May 18, 1915
Field Superintendent, The Logan Natural Gas & Fuel Company, 900 Mechanic Street, Utica, Ohio.

Snider, C...May 18, 1915
Superintendent, Cahokia Gas & Oil Company, 252 North Main Street, Edwardsville, Illinois.

Snyder, H. L...May 21, 1912
Room 503 Goff Building, Clarksburg, West Virginia.

Snyder, Robert M. Jr...March 20, 1906
President, New York Oil and Gas Company, Director, Kansas Natural Gas Company; Director, Caney Gas Company, 316 American Bank Building, Kansas City, Missouri.

Snyder, S. W...May 16, 1916
Foreman, United Natural Gas Company, 14 River Street, Sharon, Pennsylvania.

Soper, R. G...May 16, 1911
Secretary, The Dallas Gas Company, 2016 Jackson Street, Dallas, Texas.

South, W. H...May 18, 1915
Secretary, Treasurer, General Manager, Randall Gas Company, P. O. Box 554, Morgantown, West Virginia.

Southwick, E. F...May 15, 1917
Credit Clerk, East Ohio Gas Company, 7021 Quimby Avenue, Cleveland, Ohio.

Spain, W. H...May 16, 1911
District Representative, Oil Well Supply Company, 215 Water Street, Pittsburgh, Pennsylvania.

Spencer, C. H...May 15, 1917
Shop Superintendent, Calgary Gas Company, Limited, 215 Sixth Avenue, West, Calgary, Alberta, Canada.

Spicer, B. F...May 16, 1916
Agent, Logan Natural Gas & Fuel Company, Bucyrus, Ohio.

Sprague, H. H...May 17, 1910
President, Sprague Meter Company, 205 Water Street, Bridgeport, Connecticut.

Sprenkle, W. A...May 16, 1916
Secretary-Treasurer, Natural Gas Company of West Virginia, 323 Fourth Avenue, Pittsburgh, Pennsylvania.

Stafford, G. M...May 15, 1917
Foreman, Pennsylvania Gas Company, 202 East Washington Street, Corey, Pennsylvania.

Staniek, A. E...May 16, 1916
Chief Clerk, Contracting Department, Philadelphia Company, 435 Sixth Street, Pittsburgh, Pennsylvania.

Stearns, G. A...May 15, 1917
Sawyer-Stearns-Streeter Drilling Corporation, 401 Iroquois Building, Buffalo, New York.

Stearns, James W......................................May 20, 1913
Division Superintendent, Iroquois Natural Gas Company, 401 Iroquois Building, Buffalo, New York.

Steenbergen, C. L......................................May 19, 1914
Manager, Paris Gas & Electric Company, Paris, Kentucky.

Steere, F. W......................................May 15, 1917
President, Steere Engineering Company, Woodward and Horton Avenue, Detroit, Michigan.

Stein, F. V......................................May 16, 1916
Foreman, United Natural Gas Company, 570 Arch Street, Meadville, Pennsylvania.

Sternburg, F. M......................................May 19, 1914
Field Foreman, Iroquois Natural Gas Company, Evans Street, Hamburg, New York.

Stephanus, E. M......................................May 15, 1917
Salesman, Broderick & Bascom Rope Company, 805 North Main Street, St. Louis, Missouri.

Stephens, T. H......................................May 16, 1916
Agent, The Manufacturers Light & Heat Company, East Liverpool, Ohio.

Sterrett, Louis E......................................May 16, 1916
Manager, Smithport Gas Company, Smithport, Pennsylvania.

Stewart, S. B......................................May 17, 1910
General Contracting Agent, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Stewart, William......................................May 16, 1916
General Foreman, Allegheny Heating Company, 603 Burd Street, North Side, Pittsburgh, Pennsylvania.

Stitt, John C......................................May 16, 1916
Field Foreman, Carnegie Natural Gas Company, West Union, West Virginia.

Stokes, D. J. Jr......................................May 16, 1916
Field Superintendent, The Natural Gas Company of West Virginia, Harveys, Greene County, Pennsylvania.

Stone, Frederick W......................................May 21, 1907
Manager, Ashtabula Gas Company, 6 Progress Street, Ashtabula, Ohio.

Storey, Verne W......................................May 18, 1915
Vice President and Manager, Dixie Gas & Water Company, Box 121, Oil City, Louisiana.

Stotler, R. M......................................May 19, 1908
District Manager, Pittsburgh Meter Company, 605 Victor Building, Kansas City, Missouri.

Stout, Wilber......................................May 16, 1916
Assistant Geologist, Geological Survey of Ohio, 40 East Lane Avenue, Columbus, Ohio.

Streiber, Theo......................................May 20, 1913
Superintendent of Contracts, Sun Vapor & Gas Street Light Company, 1000 South Market Street, Canton, Ohio.

Strickler, James P......................................May 21, 1907
Superintendent Distribution, Columbus Gas & Fuel Company, 135 North Front Street, Columbus, Ohio.

Stringer, Harrison......................................May 18, 1915
Superintendent, Dominion Natural Gas Company, Simcoe, Ontario, Canada.

Strong, Murray......................................May 16, 1916
Foreman, Arkansas Natural Gas Company, Arkadelphia, Arkansas.

Stroup, Lloyd......................................May 15, 1917
Field Foreman, Dominion Gas Company, Merlin, Ontario, Canada.

Stroup, John......................................May 15, 1917
Foreman, Glenwood Natural Gas Company, Limited, Port Alma, Ontario, Canada.

Stuart, George J......................................May 16, 1911
Chief Engineer, Pittsburgh Valve Foundry & Construction Company Twenty-sixth Street and A. V., R. R., Pittsburgh, Pennsylvania.

Sullivan, J. H.......................................May 20, 1913
Superintendent, Street Department, The East Ohio Gas Company, East 62nd, North of St. Clair, Cleveland, Ohio.

Sullivan, P. D......................................May 16, 1916
Foreman, Iroquois Natural Gas Company, 37 Church Street, Buffalo, New York.

Sullivan, T. O.......................................May 16, 1911
General Manager, Manufacturers Light & Heat Company, 314 Columbia Bank Building, Pittsburgh, Pennsylvania.

Sutton, A. I......................................May 16, 1916
Foreman, Hope Natural Gas Company, R. F. D., St. Marys, West Virginia.

Swan, George J......................................May 18, 1909
Superintendent, Consumers Light, Heat & Power Company, 214 East First Street, Topeka, Kansas.

Swartz, J. K.......................................May 16, 1916
Foreman, Hope Natural Gas Company, Salem, West Virginia.

Sweetman, W. D.......................................May 16, 1911
Superintendent, Peoples Gas Light & Coke Company, 1241 Dinisian Street, Chicago, Illinois.

Sykes, J. D.......................................May 16, 1911
Superintendent, The Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Swendeman, Joseph E......................................May 15, 1917
Special Representative, American Steam Gauge & Valve Mfg. Company, 256 West Newton Street, Boston, Massachusetts.

Tanner, J. Roy......................................May 16, 1911
General Manager, Pittsburgh Valve, Foundry & Construction Company, P. O. Box 1016, Pittsburgh, Pennsylvania.

Taylor, E. R.......................................May 18, 1915
Secretary and Treasurer, Fayette Light & Fuel Company, Fayette, Alabama.

Taylor, George......................................May 15, 1917
Foreman, Alden-Batavia Natural Gas Company, Batavia, New York.

Taylor, George E. .... May 15, 1917
Assistant Engineer, Public Service Commission of West Virginia, State House, Charleston, West Virginia.

Taylor, J. W. .... May 16, 1916
Foreman, Reserve Gas Company, 226 Bennet, Weston, West Virginia.

Teague, O. C. .... May 21, 1912
President, The Utica Gas, Oil & Mining, Utica, Ohio.

Teegustram, Victor S .... May 15, 1917
Plumbing, 141 Fraley Street, Kane, Pennsylvania.

Terry, L. B. .... May 16, 1911
Agent, The East Ohio Gas Company, 12-21 North High Street, Akron, Ohio.

Texter, L. J. .... May 15, 1917
Foreman, Alden-Batavia Natural Gas Company, Pavilion, New York.

Thatcher, J. H. .... May 21, 1912
Manager, Mansfield Gas Company, Jefferson Street, Mansfield, Louisiana.

Thiel, Martin A .... May 18, 1915
Chief Engineer, Engine Department, The C. & G. Cooper Company, 118 East Lamartine Street, Mt. Vernon, Ohio.

Thomas, Edgar .... May 20, 1913
Gas Engineer, Hope Engineering Company, 826 Farmers Bank Building, Pittsburgh, Pennsylvania.

Thomas, Fred H .... May 16, 1916
Sales Engineer, The C. & G. Cooper Company, Mt. Vernon, Ohio.

Thomas, Howard V .... May 16, 1911
Vice President, West Virginia & Maryland Gas Company, 312 Fidelity Building, Buffalo, New York.

Thompson, Paul .... May 17, 1910
Fifth Vice-President, The United Gas Improvement Company, Broad and Arch Street, Philadelphia, Pennsylvania.

Thompson, William H. .... May 16, 1911
Attorney, The Ohio Fuel Supply Company, 930 Williamson Building, Cleveland, Ohio.

Thompson, W. P. .... May 15, 1917
55 Kennedy Street, Bradford, Pennsylvania.

Thomson, L. S. .... May 18, 1915
Salesman, La Belle Iron Works, Steubenville, Ohio.

Tibbens, W. P .... May 20, 1913
Shop Foreman, The East Ohio Gas Company, 10611 Garfield Avenue, Cleveland, Ohio.

Tillotson, F. H. .... May 20, 1913
City Foreman, The Pennsylvania Gas Company, 116 Broadhead Avenue, Jamestown, New York.

Tims, H. S. .... May 18, 1913
Treasurer, The Canadian Western Natural Gas, Light, Heat & Power Company, Limited, 215 Sixth Avenue, West, Calgary, Alberta, Canada.

Tippett, W. H.......................................May 19, 1908
Secretary-Treasurer, Creek County Company, Box 126, Cushing, Oklahoma.

Titzel, J. C.......................................May 16, 1916
General Manager, Glenshaw Neutral Gas Company, Glenshaw, Pennsylvania.

Titzel, R. John.......................................May 15, 1917
Gas Engineer, United Gas Electric Corporation, 2100 First Avenue, Birmingham, Alabama.

Tomb, Frank B.......................................May 18, 1915
Superintendent Land Department, Southern Ontario Gas Company, Limited, 301 Central Avenue, London, Ontario, Canada.

Tomer, Adam.......................................May 16, 1916
Shop Foreman, The Peoples Natural Gas Company, 1919 Forbes Street, Pittsburgh, Pennsylvania.

Tonkin, John B.......................................May 21, 1912
Vice President, The Reserve Gas Company, 424 Sixth Avenue, Pittsburgh, Pennsylvania.

Tonkin, John.......................................May 15, 1917
Vice President and General Manager, Central Kentucky Natural Gas Company, Oil City, Pennsylvania.

Tonkin, T. J., Jr.......................................May 15, 1917
Superintendent, Frankfort, Kentucky, Natural Gas Company, Frankfort, Kentucky.

Tonkin, Wade H.......................................May 16, 1916
Agent, Hope Natural Gas Company, 250 West Tenth Street, Parkersburg, West Virginia.

Topp, A. A.......................................May 15, 1917
Foreman, Central Repair Shop, The Ohio Fuel Supply Company, Mt. Vernon, Ohio.

Torrance, C. E.......................................May 16, 1916
Agent, The Peoples Natural Gas Company, Altoona, Pennsylvania.

Torrance, E. E.......................................May 15, 1917
Foreman, Frost Gas Company, Fredonia, New York.

Torrance, J. M.......................................May 16, 1916
Agent, The Peoples Natural Gas Company, 28 North Walnut Street, Blairsville, Pennsylvania.

Towl, Forrest M.......................................May 21, 1912
President, Southern Pipe Line Company, 26 Broadway, New York, New York.

Tracy, F. B.......................................May 16, 1916
Manager Muncie Division, Central Indiana Gas Company, 301 East Main Street, Muncie, Indiana.

Tracey, Frank D.......................................May 16, 1911
Purchasing Agent, West Virginia & Maryland Gas Company, 312 Fidelity Building, Buffalo, New York.

Treat, Ellis M.......................................May 16, 1911
1912 Union Bank Building, Pittsburgh, Pennsylvania.

Trees, J. C.......................................May 16, 1911
President, Afkansas Natural Gas Company, Benedum-Trees Building, Pittsburgh, Pennsylvania.

Treleaven, L. G..May 21. 1907
Secretary and Manager, Consumers Light, Heat & Power Company, 824 Kansas Avenue, Topeka, Kansas.

Troutman, P. A..May 16, 1916
Division Superintendent, Carnegie Natural Gas Company, Sherman and Sixth Streets, Waynesburg, Pennsylvania.

Tucker, Calvert C..May 15, 1917
Engineer, Dominion Natural Gas Company, 842 Marine National Bank Building, Buffalo, New York.

Tucker, Davis H..May 15, 1917
Engineer, Southern Ontario Gas Company, Limited, R. R. No. 4, Merlin, Ontario, Canada.

Tucker, G. C..May 16, 1916
Foreman, The East Ohio Gas Company, 1101 Second Street, Massillon, Ohio.

Turner, Lyle..May 20, 1913
Credits and Collections, The East Ohio Gas Company, East Ohio Gas Building, Cleveland, Ohio.

Tyng, Arthur..May 15, 1917
Consulting Engineer, Iroquois Natural Gas Company, 709 Iroquois Building, Buffalo, New York.

Underwood, R. L..May 16, 1916
Manager and Assistant Secretary and Treasurer, Herring Oil & Gas Company, North Side Ellis, Grossbeck, Texas.

Vallely, J. F..May 15, 1917
Agent, Cattaraugus, New York, Iroquois Natural Gas Company, Cattaraugus, New York.

Vance, George B..May 16, 1916
Superintendent, Drilling Department, Randall Gas Company, Mapletown, Pennsylvania.

Vandergrift, T. T..May 16, 1916
Field Superintendent, Preston Oil Company, Lancaster, Ohio.

VanSickel, Walter S..May 17, 1910
General Manager, Southwestern General Gas Company, 516 No. "A" Street, Fort Smith, Arkansas.

Voelkle, L. P..May 18, 1915
Chief Clerk, The East Ohio Gas Company, Youngstown, Ohio.

Wadsworth, W. A..May 18, 1915
District Manager, Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Walker, W. O..May 16, 1916
Secretary-Treasurer, Frankfort (Kentucky) Natural Gas Company, 206 Seneca Street, Oil City, Pennsylvania.

Wall, W. A..May 18, 1915
Auditor, Southwestern Gas & Electric Company, Caddo Division, Shreveport, Louisiana.

Wallace, H. A..May 18, 1915
General Manager, United Fuel Gas Company, 919 Quarrier Street, Charleston, West Virginia.

Wallace, J. B..May 18, 1915
Superintendent, Logan Natural Gas & Fuel Company, 134 College Avenue, Ashland, Ohio.

Walsh, D. C..May 20, 1913
General Foreman, The East Ohio Gas Company, 400 Tuscarawas Avenue, Canton, Ohio.

Walsh, John H..Mayy 20, 1913
Superintendent, Iroquois Natural Gas Company, Church and Franklin Streets, Buffalo, New York.

Walsh, Maurice W..February 27, 1906
Superintendent, Distribution and Construction, The Louisville Gas & Electric Company, 311 West Chestnut Street, Louisville, Kentucky.

Walters, C. K..May 16, 1916
District Foreman, Equitable Gas Company, Chestnut and Lydia Streets, Carnegie, Pennsylvania.

Walton, J. D..May 18, 1915
General Inspector, 315 Trenton Avenue, Uhrichsville, Ohio,

Wanamaker, George B..May 20, 1913
General Manager, The Highland Development Company, Lock Box 56, Wooster, Ohio.

Ward, C. F..May 16, 1916
Foreman Construction Department, Ohio Fuel Supply Company, Homer, Ohio.

Ward, R. W..May 20, 1913
Foreman, United Natural Gas Company, Oil City, Pennsylvania.

Wardell, Charles W..May 20, 1913
Welsbach Company, Gloucester, New Jersey.

Waring, C. H..May 21, 1912
Superintendent, The Wyandotte County Gas Company, 600 Minnesota Avenue, Kansas City, Kansas.

Watson, W. E..May 21, 1912
Assistant General Manager of Sales, The Youngstown Sheet and Tube Company, Youngstown, Ohio.

Watts, Albert E..May 21, 1912
Oil and Gas Producer, 1401 South Carson Street, Tulsa, Oklahoma.

Watts, Harry P..May 15, 1917
Field Clerk, Peoples Natural Gas Company, Brave, Greene County, Pennsylvania.

Way, William B..May 18, 1909
District Manager, The Ludlow Valve Manufacturing Company, 2008 First National Bank Building, Pittsburgh, Pennsylvania.

Wearing, George E..May 16, 1916
Vice President and General Manager, The Elk Natural Gas Company, Second National Bank Building, Clarion, Pennsylvania.

Weaver, S. D..May 16, 1916
Agent, Manufacturers Gas Company, Bradford, Pennsylvania.

Webber, Daniel S..May 20, 1913
Superintendent Lease Department, The Ohio Fuel Supply Company, 52 West Gay Street, Columbus, Ohio.

Wege, Henry P..May 15, 1917
Oil Well, Refinery and Mill Supplies, Henry P. Wege, 24 Horn Avenue, Oil City, Pennsylvania.

Weir, James B..May 18, 1915
Secretary-Treasurer, Falling Rock Cannel Coal Company, National City Bank Building, Charleston, West Virginia.

Weisenberger, L. L..May 18, 1915
Industrial Engineer, The Ohio Fuel Supply Company, 97 North Front Street, Columbus, Ohio.

Welch, William M..February 27, 1906
Gas Engineer, United States Bureau of Mines, 506 Customhouse, San Francisco, California.

Welker, George E..May 20, 1913
Chief Engineer, Iroquois Natural Gas Company, 311 Iroquois Building, Buffalo, New York.

Wellman, A. Miner..May 15, 1917
President, Tri-County Natural Gas Company, Caledonia, New York.

Wells, L. D..May 18, 1915
District Superintendent, Caddo Division, Southwestern Gas & Electric Company, Vivian, Louisiana.

Wentzel, H. W..May 16, 1916
Assistant Storekeeper, Equitable Gas Company, Twenty-third and Liberty Avenue, Pittsburgh, Pennsylvania.

Werner, E. M..May 20, 1913
New Business Department, The East Ohio Gas Company, 1405 East Sixth Street, Cleveland, Ohio.

West, Grant..May 20, 1913
Chief Station Engineer, United Natural Gas Company, Sigel, Pennsylvania.

Westcott, Henry P..May 21, 1907
Engineer, Metric Metal Works, 1004 West Twenty-sixth Street, Erie, Pennsylvania.

Weymouth, T. R..May 16, 1911
Chief Engineer, United Natural Gas Company, 308 Seneca Street, Oil City, Pennsylvania.

Wheeler, Edward M..May 21, 1912
Treasurer, West Virginia Central Gas Company, 312 Fidelity Building, Buffalo, New York.

Wheelhouse, Sidney H..May 18, 1915
Manager Gas Furnace Department, Columbus Heating & Ventilating Company, 425-435 West Town Street, Columbus, Ohio.

Whitcomb, E. C..May 19, 1914
Chief Engineer, Manufacturers Gas Company, Brookville, Pennsylvania.

Whitcomb, E. P..May 18, 1909
President and General Manager, The Union Natural Gas Corporation, Union Bank Building, Pittsburgh, Pennsylvania.

White, David..May 16, 1916
Foreman, Hope Natural Gas Company, Smithville, West Virginia.

White, T. J..May 16, 1916
Field Foreman, Carnegie Natural Gas Company, Hundred, West Virginia.

Whitehead, L. K......................................June 12, 1906
Superintendent, Gas Department, Southwestern Gas & Electric Company, 116 East Broad Street, Texarkana, Arkansas-Texas.

Wickham, T. F......................................May 20, 1913
Secretary-Treasurer, The Union Gas & Electric Company, Fourth and Plum Streets, Cincinnati, Ohio.

Wickett, Gordon, D......................................May 18, 1915
Secretary, Windsor Gas Company, Limited, 56 Ouellette Avenue, Windsor, Ontario, Canada.

Wiggins, J. H......................................May 15, 1917
Engineer, Indian Territory, Illinois Oil & Gas Company, Box 1042 Bartlesville, Oklahoma.

Wikoff, J. B......................................May 16, 1911
Treasurer, The Ohio Fuel Supply Company, 2107 Farmers Bank Building, Pittsburgh, Pennsylvania.

Wilkinson, A. L......................................May 18, 1915
Treasurer, National Gas, Electric Light & Power Company, 1714 Ford Building, Detroit, Michigan.

Williams, D. W......................................May 15, 1917
Geologist, Dominion Natural Gas Company, Limited, 842 Marine National Bank Building, Buffalo, New York.

Williams, John B......................................May 16, 1911
Secretary-Treasurer, The Sarnia Gas & Electric Company, Limited, 217 North Front Street, Sarnia, Ontario, Canada.

Williams, John H......................................May 16, 1916
Superintendent, Hope Natural Gas Company, Despard Street, Clarksburg, West Virginia.

Williams, R. J......................................May 20, 1913
Chief Engineer, United Natural Gas Company, Kane, R. R. No. 2, Pennsylvania.

Williams, W. A......................................May 15, 1917
Superintendent, Eastern Oil Company, Weston, West Virginia.

Williams, W. A......................................May 20, 1913
Assistant to General Manager, Empire Gas & Fuel Company, Bartlesville, Oklahoma.

Williamson, E. W......................................May 16, 1916
Division Superintendent, Hope Natural Gas Company, 1726 Saint Marys Avenue, Parkersburg, West Virginia.

Willoughby, Horace......................................May 18, 1909
Assistant Manager, Scioto Valley Supply Company, Third and Long Streets, Columbus, Ohio.

Willsey, J. H......................................May 15, 1917
Assistant Superintendent, Ashtabula Gas Company, 6 Progress Street, Ashtabula, Ohio.

Wilson, A. M......................................May 16, 1911
Room 330, Robinson Building, Tulsa, Oklahoma.

Wilson, Henry M......................................May 16, 1911
District Agent, Pittsburgh Valve, Foundry & Construction Company, 1308 Rockefeller Building, Cleveland, Ohio.

Wilson, J. C......................................May 21, 1912
Engineer, Cutler-Hammer Manufacturing Company, Twelfth Street and Saint Paul Avenue, Milwaukee, Wisconsin.

Wilson, J. W..May 18, 1915
Manager, Knapp Oil & Gas Company, Weston, West Virginia.

Wilson, W. E..May 15, 1917
Agent, Pennsylvania Gas Company,, 100 West Main Street, Corry, Pennsylvania.

Wingard, Guy H..May 16, 1916
Foreman, Manufacturers Gas Company, Marlin Building, Brookville, Pennsylvania.

Wittkorski, F. D..May 15, 1917
Chief Inspector, Union Natural Gas Company of Canada, Limited, 95 Wellington Street, Chatham, Ontario, Canada.

Wittmer, George, Jr..May 16, 1911
Assistant General Manager, American Natural Gas Company, 1511 Park Building, Pittsburgh, Pennsylvania.

Wittmer, Henry..May 18, 1909
Secretary, American Natural Gas Company, 407 Park Building, Pittsburgh, Pennsylvania.

Wittmer, Thomas..May 17, 1910
Division Superintendent, American Natural Gas Company, 1013 Sheridan Avenue, Pittsburgh, Pennsylvania.

Wolfe, W. W..May 19, 1914
Assistant Secretary, United Fuel Gas Company, 1590 Quarrier Street, Charleston, West Virginia.

Wonderly, W. V..May 16, 1916
Superintendent, Compression Plants, Logan Natural Gas & Fuel Company, 34 Ruggery Building, Columbus, Ohio.

Wood, L. L..May 15, 1917
Foreman, Pennsylvania Gas Company, 205 East Fifth Avenue, Warren, Pennsylvania.

Wood, W. L., Jr..May 17, 1910
General Manager, Southwestern Gas & Electric Company, 116 East Broad Street, Texarkana, Arkansas.

Woodworth, R. B..May 16, 1911
Engineer, Carnegie Steel Company, 427 Carnegie Building, Pittsburgh, Pennsylvania.

Wrenn, J. W..May 20, 1913
Assistant General Manager, Economic Gas Company, 314 West Third Street, Los Angeles, California.

Wyer, Samuel S..May 21, 1912
Consulting Engineer, Hartman Building, Columbus, Ohio.

Yardley, George..May 20, 1913
Secretary to the General Manager, United Natural Gas Company, 206 Seneca Street, Oil City, Pennsylvania.

Yorke, Patrick..May 16, 1911
Manager, Yorke Derrick Company, 199 North Main Street, Washington, Pennsylvania.

Young, James M. H..................................February 27, 1906
Manager, City Gas Company, 215 Dundar Street, London, Ontario, Canada.

Young, W. H..May 16, 1916
Purchasing Agent, South Hills Oil & Gas Company, 223 Fourth Avenue, Pittsburgh, Pennsylvania.

Young, William T. .... May 20, 1913
Mechanical Engineer, United Natural Gas Company, 513 North Street, Oil City, Pennsylvania.

Zeigler, R. A. .... May 20, 1913
Auditor, Central Indiana Gas Company, 301-3 East Main Street, Muncie, Indiana.

Zeller, S. E. .... May 20, 1913
General Foreman, The East Ohio Gas Company, 322 Wooster Avenue, Canal Dover, Ohio.

Zimmerman, C. W. .... May 16, 1916
Chief Clerk, Philadelphia Company, 435 Sixth Avenue, Pittsburgh, Pennsylvania.

Zitzewitz, W. R. .... May 19, 1908
Secretary-Treasurer, National Machine Works, Sheffield and North Avenues, Chicago, Illinois.

SUMMARY OF CLASSES OF MEMBERSHIP.

Honorary Members	8
Active Members	1,288
Total	1,296

GEOGRAPHICAL DISTRIBUTION

Alabama.

Birmingham .... R. John Titzel
Fayette .... E. R. Taylor

Arkansas.

Arkadelphia .... Murray Strong
Fort Smith .... W. A. Robertson
Walter S. VanSickle
Hope .... M. F. Secrest
Little Rock .... W. F. Booth
E. J. Cole
B. J. Gifford
C. W. Kramer
John Russell Munce
W. T. Roberts
Malvern .... A. J. Gilbert
Pine Bluff .... M. D. Randolph
Prescott .... James Barry
Texarkana .... L. K. Whitehead
W. L. Wood, Jr.

California.

Bakersfield .... J. F. McMahon
Los Angeles .... Frank Cavenagh
Walter B. Cline
Alexander B. Macbeth
Nathan L. Morse
F. Shafer
J. W. Wrenn
San Francisco .... W. R. Hamilton
John Martin
William M. Welch
Santa Maria .... L. F. Chandler
Taft .... Frederick F. Doyle
William Moeller, Jr.

Connecticut.

Bridgeport .... W. P. Hutchinson
H. H. Sprague
Waterbury .... John Douglass Alden

District of Columbia.

Washington	R. S. McBride
	J. S. Perry

Illinois.

Aurora	Carroll Miller
Chicago	William Alfred Baehr
	O. M. Carter
	Henry M. Dawes
	W. H. Graffis
	W. S. Grear
	W. H. Hodge
	B. J. Kellum
	John W. Lansley
	Joseph C. Markley
	Edward G. Pratt
	Milt. Saul
	W. D. Sweetman
	W. R. Zitzewitz
Decatur	J. H. McCormick
	Fred B. Mueller
Edwardsville	C. Snider
Jacksonville	John D. Robertson
Quincy	George J. Fischer
Palestine	R. A. Crawford
Rockford	John F. Parker

Indiana.

Anderson	J. C. Groble
	H. C. Reynolds
Marion	D. S. Milne
Middletown	C. R. Heath
Muncie	A. T. Bartow
	E. L. Haymond
	Harry R. Maxon
	John H. Maxon
	F. B. Tracy
	R. A. Ziegler
Vincennes	A. M. Ewing

Kansas.

Chanute	Hugh T. Jones
Coffeyville	L. E. Robinson
	W. H. Shepard
Garnett	Gail Carey

Kansas — Concluded

Independence	H. I. Cowhan
	Con. Cumings
	C. A. Gibson
	Victor Hays
	Paul R. Johnson
	G. F. Mahan
	J. E. Remler
	R. Shade
Iola	F. J. Horton
Kansas City	Wm. Hunter McKenzie
	C. H. Waring
Lawrence	E. H. S. Bailey
	Caryl J. Dodds
	Erasmus Haworth
Mound Valley	F. M. Gilmore
Sedgwick	C. F. Mason
Topeka	George J. Swan
	L. G. Treleaven
Wichita	W. S. Hoyte
	E. S. Miller
	L. O. Ripley
	G. N. Rumbaugh
	H. S. Sladen

Kentucky.

Ashland	J. W. Anderson
Covington	Gordon M. Campbell
	D. C. Shaffer
	Albert Silva
Frankfort	T. J. Tonkin, Jr.
Irvine	James C. Heydrick
Louisville	Donald McDonald
	J. R. Ramage
	Maurice W. Walsh
Marysville	Horace J. Cochran
Paris	C. L. Steenbergen
Winchester	Calvin T. Moore

Louisiana.

Lewis	W. H. Buckley
Mansfield	J. H. Thatcher
Mooringsport	G. S. Boyd
	George E. Jordan
Oil City	Verne W. Storey

Louisiana — Concluded

Shreveport	J. P. Bahan
	M. B. Carmody
	Austin G. Curtis
	C. A. Dally, Jr.
	T. J. Hurd
	G. R. Jordan
	S. A. McCune
	T. F. O'Brien
	J. F. Palmer
	W. M. Palmer
	George B. Sipe
	W. A. Wall
Vivian	W. A. Long
	L. D. Wells

Maryland.

Baltimore	Charles M. Cohn
Cumberland	J. C. Cunningham

Massachusetts.

Boston	Godfrey L. Cabot
	Henry B. Nickerson
	Joseph Swendeman

Michigan.

Detroit	Warren S. Blauvelt
	D. F. Burritt
	Roy A. Field
	W. S. Guitteau
	James T. Lynn
	Henry D. Schall
	F. W. Steere
	A. L. Wilkinson

Missouri.

Joplin	Charles D. Bell
	B. J. Crahan
Kansas City	E. L. Brundrett
	R. W. Goodnow
	Alfred Hurlburt
	T. B. Jarvies
	Hoyle Jones
	R. L. Kidner
	Eugene Metz, Jr.

Missouri — Concluded

Kansas City .... Frank F. Schauer
J. M. Scott
Robert M. Synder, Jr.
R. M. Stotler
M. M. Sweetman
St. Joseph .... Vincent I. Elbert
J. Wylie Mitchell
St. Louis .... William K. Hughes
Lee B. Mettler
Robert Seegar
E. M. Stephanus
Webb City .... Charles O'Neill

New Jersey.

Glouster City .... Alphonso Mason
Charles W. Wardell

New York.

Albany .... Charles F. Leonard
Alden .... W. H. Baas
Akron .... John Fisher
Angola .... J. D. Cleary
Attica .... Charles W. Slack
Batavia .... Charles E. Hill
E. B. Kellogg
G. D. Lynch
George Taylor
Buffalo .... Thomas Armstrong
Lucius Seymour Bigelow
T. P. Blackall
John T. Blewett
C. E. Borchard
L. H. Brown
C. L. Butler
W. C. Carey
J. P. Conners
Frank Cosan
W. M. Cusack
Herbert R. Davis
Dorr T. Denton
Bernard F. Dowd
R. G. Dreher
J. T. Flanigan
H A. Forman

New York — Continued

Buffalo .... A. W. Gavin
B. J. Grammel
Homer R. Gray
Henry C. Hall
H. E. Hall
H. Harney, Jr.
William Hastings
B. J. Hawkins
Ralph Hockstetter
H. R. Hoffman
Perry A. Little
Guy Loveridge
Frank M. Lowrey
Carl H. Lutz
John T. Mahoney
G. E. McCann
Edward P. McCormick
J. E. McKimmie
D. P. McMahon
John McMahon
Edwin Allan McPherson
W. Lorne Munro
Henry S. Norris
B. C. Oliphant
F. H. Oliphant
Ira B. Reed
D. M. Reilly
J. A. Ritchie
E. M. Ryan
J. R. Shattuck
C. M. Sloan
W. L. Sloan
G. A. Stearns
James W. Stearns
P. D. Sullivan
Howard V. Thomas
Frank D. Tracey
C. C. Tucker
Arthur Tyng
John H. Walsh
George E. Welker
Edward M. Wheeler
D. W. Williams

New York — Continued

Caledonia	A. G. Baker
	M. A. Brady
	A. Miner Wellman
Cattaraugus	J. F. Vallely
Collins Center	Charles L. Reiser
Corning	George F. Goff
	W. M. Gurnsey
Dunkirk	F. Fair
	G. E. Falk
	M. E. Hammon
East Aurora	E. K. Fuller
Fredonia	E. E. Torrance
Gardenville	S. F. Brandell
Gowanda	M. McIntyre
Hamburg	D. M. Dittman
	John Hastings
	Frank Johnson
	F. M. Sternburg
Holcomb	L. L. Case
Honeoye Falls	Franklin L. Kellogg
Hornell	J. B. Bradley
Jamestown	James M. Cratty
	E. M. Schlaudecker
	F. H. Tillotson
Lancaster	Peter P. Adolf
LeRoy	J. S. L. Purdy
New York	H. C. Abell
	William E. Barrett
	A. C. Bedford
	R. W. Brink
	Cameron Brown
	L. G. Coleman
	J. W. R. Crawford
	S. J. Dill
	Henry L. Doherty
	A. E. Forstall
	Robert G. Griswold
	Alexander C. Humphreys
	George H. Jones
	W. J. Judge
	H. K. Landis
	Alanson P. Lathrop
	Henry O. Loebell
	E. J. Marston

New York — Concluded

New York	Emerson McMillin
	Alten S. Miller
	Worden Pope
	C. A. H. de Saulles
	Marvin Shiebler
	Forrest M. Towl
Olean	F. W. Herron
	H. L. Jacoby
Orchard Park	C. T. Sloan
Pavilion	W. H. Lobaugh
	L. J. Texter
Rochester	R. M. Searle
Salamanca	J. L. Ryan
Sheridan	W. J. Doty
Springville	Frank D. Smith
Wellsville	Harry Bradley

Ohio.

Akron	Merrill N. Davis
	James P. McLaughlin
	James Scoville
	L. B. Terry
Alliance	W. J. Rose
Ashland	W. H. Adams
	A. E. Boyd
	J. B. Wallace
Ashtabula	A. W. Herring
	F. W. Stone
	J. H. Willsey
Barberton	S. C. McKnight
	E. L. Saeger
Berea	M. K. Clover
	P. J. Cookham
Bucyrus	W. S. Frey
	B. F. Spencer
Cadiz	Carl D. Mead
Cambridge	A. C. Sarchet
Canal Dover	S. E. Zellar
Canton	E. O. Deal
	D. W. Hammon
	T. M. Lee
	John J. McMahon
	W. J. Morgan
	Theo. Streiber

Ohio — Continued

Canton	D. C. Walsh
Chillicothe	Walter A. Ashley
Cincinnati	I. H. Atkins
	C. J. Bauer
	William Y. Cartwright
	C. D. Corbus
	John M. Cronin
	C. W. DeForest
	Joseph P. Delaney
	Frank Espach
	Alfred F. Flocken
	W. W. Freeman
	Judson Harmon
	F. R. Healy
	H. J. Hoover
	Charles Krause
	J. H. Lakamp
	C. R. McKay
	William A. Miller
	Frank B. Newhouse
	C. D. Reichel
	W. H. Reul
	E. R. Rothert
	R. C. Rowan
	Amy Sherlock (Miss)
	George H. Smies
	W. A Wadsworth
	T. F. Wickham
Cleveland	C. B. Apple
	M. F. Barrett
	C. L. Bryant
	Harry C. Culp
	Martin B. Daly
	F. T. Dooling
	G. C. Donahue
	C. W. Downing
	Carl Emmerling
	E. C. Fox
	R. W. Gallagher
	C. W. Gardner
	A. L. Gassett
	C. B. Gates
	Oscar C. Gericke
	E. Given

Ohio — Continued

Cleveland	J. F. Gray
	W. C. Hagan
	J. G. Hanks
	George S. Harris
	W. C. Higgins
	W. H. Holtz
	George H. Horsley
	Franklin R. Hurd
	Frank R. Hutchinson
	P. C. Jacobs
	E. T. Jones
	William H. Knight
	W. R. Knowles
	James Martin
	H. E. McCandless
	M. J. Murray
	Chas. L. Norton
	E. Burt Nutt
	W. L. Oakes
	T. M. O'Conner
	George L. Olney
	Peter S. Ostrye
	George W. Plagenz
	Ambrose Quinlan
	A. B. Rae
	Hoyt V. Shulters
	E. F. Southwick
	J. H. Sullivan
	William H. Thompson
	W. P. Tibbens
	Lyle Turner
	E. M. Werner
	Henry M. Wilson
Columbus	P. A. Alberty
	S. S. Allen, Jr.
	H. T. Ashton
	P. M. Biddison
	John Adams Bownocker
	Wm. J. Broder
	W. Re. Brown
	R. B. Burr
	Clarence E. Carter
	E. F. Clagett
	M. A. Corbett

Ohio — Continued

Columbus	Henry Coyle
	F. H. Crawford
	Frederick W. Crawford
	J. D. Creveling
	C. F. Critchfield
	J. F. Curry
	Beman G. Dawes
	Leslie B. Denning
	D. H. Foster
	D. F. Freudenberg
	John M. Gerard
	O. C. Hagen
	Herman H. Hall
	John I. Henderson
	G. E. Howard
	C. H. Jay
	T. J. Jones
	T. H. Kerr
	Oscar Krebs
	Kay C. Krick
	Alan Leamy
	Preston W. Lupher
	M. E. Lytle
	B. A. Magrew
	J. W. McCord
	M. A. Newton
	Nelson A. Newton
	J. F. Olmstead
	C. J. Palm
	C. C. Phillips
	Henry T. Phillips
	R. M. Porterfield
	E. C. Ramsey
	J. D. Renick
	E. Robinson, Jr.
	W. J. Rogers
	Elmer F. Schmidt
	G. C. Scott
	George S. Shinnick
	Wilber Stout
	James P. Strickler
	J. D. Sykes
	Daniel S. Webber
	L. L. Weisenberger

Ohio — Continued

Columbus	Sidney Wheelhouse
	Horace Willoughby
	W. V. Wonderley
	Samuel S. Wyer
Coshocton	E. B. Smith
Cuyahoga Falls	W. J. Cain
	Phil. Lewis
Dayton	W. E. Franz
	P. A. Frevert
	J. L. Lehman
	George Light
	W. W. Price
Delaware	T. C. Jones
	John F. Shoub
Denison	J. R. Matson
East Liverpool	T. H. Stephens
Elyria	William M. Adams
	H. H. Harrington
Findlay	G. P. Schatzel
	John Seibel
Fostoria	E. L. Lepper
Fremont	R. L. Hottinger
	A. H. Lewis
	Elmer Loveland
Galion	F. E. Fralic
Geneva	William E. Donnelly
Granville	H. G. Miller
Greenville	D. S. Robertson
Homer	B. F. Blake
	Hugh T. Boyd
	George G. Oberfell
	C. F. Ward
Ironton	Ira S. Burford
Jefferson	Ross Riggs
Jewett	F. N. Donaldson
Kent	O. M. Baldwin
Lancaster	William Blum
	J. C. Dallow
	John J. Klise
	James Murtaugh
	T. T. Vandergrift
Lakewood	Edward Smith
Leetonia	Robert W. Cushing
Malta	H. C. Hopp

Ohio — Continued

Mansfield	B. R. Bay
	C. E. Carter
	S. M. Douglass
	Harry G. Leight
	H. F. Finley
Marietta	F. H. Leidecker
	V. H. Lytle
	P. J. Quinlan
	F. L. Reed
Marion	M. A. Mickley
Massillon	J. A. Foster
	G. C. Tucker
Millersburg	H. H. Church
	C. F. Cluley
	J. S. Hatfield
Mt. Vernon	E. Brunner
	R. G. Lord
	C. O. Rockwell
	Martin A. Thiel
	Fred Thomas
	A. A. Topp
Newark	R. E. Boothe
	L. F. Carl
New Lexington	Ira I. Hazlett
New Philadelphia	W. H. Dimick
Niles	Charles Kieser
Norwalk	W. G. Kohl
Piqua	F. B. Reeser
Portsmouth	John McMillan
Ravenna	E. P. Martin
	Ed. Shriver
St. Clairsville	C. A. McClintock
St. Marys	Lemon G. Neely
Salem	H. A. Gager
	J. Arch. Harwood
	C. B. McCune
	J. H. Montgomery
Springfield	E. D. Abbott
Steubenville	H. W. Bishop, Jr.
	O. J. Daugherty
	L. S. Thomson
Sugar Grove	C. M. Hawk
	H. T. Holland
Tiffin	H. R. Rogers

Ohio — Continued

Toledo	James H. Barr
	R. J. Burkhalter
	Frank Collins
	F. G. Giegel
	Albert H. Gindele
	W. C. Longnecker
	Charles Mascho
	John P. McMahon
	James W. McMahon
	Charles S. Northup
	W. H. Scott
Uhrichsville	J. D. Walton
Utica	Alpheus Snoke
	O. C. Teague
Warren	G. C. Lohr
	L. M. McCormick
Washington C. H.	G. N. Clapp
Wellston	Charles H. Garard
Westerville	O. L. Bruckner
West Park	Charles Craft
	J. W. Irwin
	L. C. Klein
	A. B. Shenker
	B. Slogle
Wooster	R. A. Brooks
	James C. Bürtner
	F. D. Dougherty
	Frederick Ewing
	W. H. Frees
	Charles L. Helm
	A. G. Hottle
	Park Hovis
	H. D. Hull
	William G. Leamon
	J. L. Maloney
	M. A. McHenry
	Ira L. Neely
	H. B. Odenkirk
	Adrian T. Parr
	Clifton W. Sears
	George B. Wanamaker
Xenia	R. W. Irwin
Youngstown	John Baxter
	Harry P. Fish

Ohio — Concluded

Youngstown	C. E. Gallagher
	D. J. Geary
	William E. Manning
	L. P. Voelke
	W. E. Watson
Zanesville	H. H. Dreibelbis
	D. B. Riggs

Oklahoma.

Ardmore	H. B. Goodrich
	G. W. Russell
Bartlesville	H. O. Ballard
	Charles L. Bullock
	Jerome B. Burnett
	George H. Burriss
	Everett Carpenter
	Eugene Dailey
	Albert J. Diescher
	Frank F. Finney
	F. P. Fisher
	H. V. Foster
	A. D. Fyfe
	John D. Hackstaff
	Richard C. Hackstaff
	Roy S. Hazeltine
	W. W. Hill
	J. J. Larkin
	R. C. Russum
	J. H. Wiggins
	W. A. Williams
Chandler	W. W. Bruce
Cushing	W. H. Tippett
Drumright	J. F. Allen
Guthrie	W. J. Dibbens
Muskogee	H. C. Hoagland
Oklahoma City	Charles N. Gould
	Frank J. Meyer
Okmulgee	J. S. Clark
Pawhuska	H. H. Brenner
Poteau	Howard N. Cassel
Sapulpa	C. C. Cantrell
Tulsa	Joseph Ardizzone
	W. H. Bagley
	Eugene C. Braden

Oklahoma — Concluded

Tulsa	Glenn T. Braden
	Floyd J. Bradford
	Earle A. Clark
	J. N. Clover
	S. C. Clover
	B. M. Gessel
	Harry N. Greis
	A. L. Hastings
	Harry Heasley
	A. G. Heggem
	J. P. Herr
	A. W. Leonard
	Robert J. Lindsay
	W. R. Lindsay
	Frank I. Louis
	M. P. Lyon
	L. R. McCarthy
	S. F. McCluney
	John L. O'Donnell
	Fred J. Ossenbeck
	Jay C. Painter
	E. R. Perry
	E. W. Sinclair
	A. E. Watts
	A. M. Wilson

Pennsylvania.

Altoona	John Hilty
	C. E. Torrance
Ardmore	Isaac N. Knapp
Aspinwall	Harry E. LeFevre
	Charles A. Ralph
Belle Vernon	E. P. Noll
Blairsville	Frank Heazlett
	J. M. Torrance
Braddock	L. R. Dingman
Bradford	T. N. Barnsdall, 2nd
	Elmer Beatty
	P. M. Berwald
	George P. Booth
	C. L. Clark
	Eugene F. Conners
	A. A. Crawford
	R. R. Crowe

Pennsylvania — Continued.

Bradford	Z. B. Custer
	Carl K. Dresser
	T. L. Hanley
	L. E. Mallory
	Fred A. Miller
	A. J. Paris
	R. S. Pringle
	Frank N. Smith
	W. P. Thompson
	S. D. Weaver
Brave	J. L. Ridgway
	Harry P. Watts
Brookville	R. B. Barnes
	F. C. Deemer
	C. F. Kimmel
	E. C. Whitcomb
	Guy H. Wingard
Brownsville	Thomas D. Hann
Burgettstown	D. W. Inghram
Butler	Ralph A. Beach
	Tom M. Black
	C. M. Heeter
	W. H. Larkin
	J. F. Lyon
	Samuel Redic
Canonsburg	John Foley
	S. D. McCloy
Carnegie	C. L. Walters
Clarion	C. F. Huff
	Harry M. McCandless
	N. W. Reed
	George E. Wearing
Clermont	W. A. Hovis
Connellsville	J. E. Angle
	C. J. Poole
Coraopolis	J. J. Ewing
	John J. O'Day
Corry	G. M. Stafford
	W. E. Wilson
Donora	J. H. Leathers
DuBois	F. M. Michel
	L. M. Simmons
East Brady	C. E. Cumings
East Pittsburgh	Thomas C. Clifford

Pennsylvania — Continued.

East Pittsburgh	A. G. Holmes
Elderton	J. L. Siverling
Elkland	T. A. Fessler
Emlenton	C. E. Grant
Erdice	H. E. Nelson
Erie	Larmour Adams
	Arthur M. Blinn
	B. H. Donovan
	E. G. Germer
	Otto G. Hitchcock
	Francis H. Payne
	Charles J. Prior
	Henry P. Westcott
Fair Haven	J. S. Hildabrand
Franklin	J. A. Miller
Ford City	G. K. Bigler
	J. M. Bridges
	C. J. Crawford
Galeton	P. E. Crowl
Glenshaw	J. M. Kay
	J. C. Titzel
Glenwillard	Frank Lackey
Greensburg	J. M. Klingensmith
	Earle Pick
Greenville	A. C. Hartzell
Grove City	E. W. Jordan
Hallton	R. E. Benninger
	Frank G. Jackson
Harmony	E. H. Hutchison
Harveys	D. J. Stokes, Jr.
Homestead	H. L. Smith
Indiana	W. A. Bartley
Johnstown	Robert Munro
Kane	C. H. Adams
	E. W. Aggers
	L. C. Amey
	J. A. Henning
	John Leonard
	H. H. Marquis
	Victor S. Teegustram
	R. J. Williams
Kittanning	John Crossett
	Peter M. Kerr
Latrobe	William Heazlett

Pennsylvania — Continued.

Latrobe	S. T. Shaw
Ludlow	Dennis O'Leary
McKeesport	M. J. Garrity
Manor	W. C. McClellan
Marwood	M. B. Cypher
	F. M. Holliday
Mapleton	George B. Vance
Mayerstown	George W. Schell
Mayport	J. F. Anderson
Meadville	Hugh P. Brawley
	F. A. Fairchild
	F. V. Stein
Mercer	J. W. Ayer
Midland	J. H. Fonner
Midway	Charles R. Ballard
Monessen	M. C. Crum
Mt. Jewett	S. F. Murphy
	C. H. Russell
Mt. Morris	Robert Shear
Murraysville	W. S. King
	F. M Sloan
New Bethlehem	Arthur C. Fleming
New Castle	J. T. Campbell
New Kensington	A. E. Myers
Oakmont	J. S. McMunn
Oil City	N. H. Benninger
	E. R. Boyle
	Patrick C. Boyle
	Fred N. Chambers
	W. P. Craig
	James B. Crawford
	Ronald B. Crawford
	Raymond Cross
	H. M. Ernst
	C. W. Gleason
	Lyman L. Graham
	Lynn Holbrook
	D. K. James
	John F. Mason
	P. L. Mulkin
	C. E. Oliver
	C. A. Pearson
	Fred S. Rich
	F. Sartorius

Pennsylvania — Continued.

Oil City	Joseph Seep
	John Tonkin
	W. O. Walker
	R. W. Ward
	Henry P. Wege
	T. P. Weymouth
	George Yardley
	William T. Young
Philadelphia	Harry S. Battin
	Samuel T. Bodine
	William Laird Brown
	Walton Clark
	W. F. Douthirt
	C. Willing Hare
	Robert C. James
	John Bartleman Klumpp
	Lewis Lillie
	Sidney Mason
	John D. McIlhenny
	Rollin Norris
	Edward H. Rogers
	Paul Thompson
Pittsburgh	Walter Abbe, Jr.
	Daniel Armstead
	Andrew A. Armstrong
	W. H. Arnold
	Walter H. Arras
	L. F. Barger
	George W. Barnes
	E. O. Bartlett
	John C. Bartlett
	R. H. Bartlett
	E. L. Bartley
	G. F. Batchelor
	R. D. Beardsley
	George K. Benner
	O. Bieler
	J. E. Billingsley
	Arthur Boothe
	H. K. Bragdon
	C. J. Braun, Jr.
	A. L. Brinham
	George R. Brink
	D. J. Brown

Pennsylvania — Continued.

Pittsburgh	Louis Brown
	James I. Buchanan
	S. E. W. Burnside
	George A. Burrell
	H. W. Burson
	J. B. Cappeau
	W. B. Carson
	W. C. Chaplin
	W. B. Chapman
	James Clark
	Robert E. Clark
	W. G. Cole
	W. F. Corcoran
	John B. Corrin
	Albert B. Craig
	C. E. Crawford
	G. W. Crawford
	G. A. Crosby
	R. H. Cunningham
	A. B. Dally, Jr.
	Harvey N. Dauler
	A. P. Davis
	H. Alexander Dean
	William C. Edwards
	E. J. Egan
	C. D. Evans
	F. I. Falk
	Otto F. Felix
	T. B. Foley
	T. H. Foley
	L. C. Frohrieb
	J. B. Garner
	John Gates, Jr.
	John E. Gill
	J. R. Goldsborough
	A. R. Gray
	William T. Griswold
	F. D. Grunder
	Joseph F. Guffey
	E. F. Gwynn
	F. L. Hadley
	W. R. Hadley
	C. T. Hall
	Robert W. Hannan

Pennsylvania — Continued.

Pittsburgh .... Ralph W. Hay
J. H. Healy
F. P. Hegerty
M. H. Henning
H. D. Hildabrand
Dudley M. Hill
J. B. Hill
David O. Holbrook
E. D. Ivory
C. W. Johnson
Norwood Johnston
Roswell H. Johnson
Russell A. Johnson
J. E. Keenan
J. W. Kelly
J. J. Kennedy
A. N. Kerr
J. King
Virgil P. Kline
Frank Knapp
George T. Ladd
Robert Law, Jr.
Miles B. Layton
Edward D. Leland
R. M. Leland
F. A. Levy
Frank O. LeRoy
F. C. Leslie
T. L. Lewis
M. R. Marple
J. O. Martin
John G. McCabe
C. H. McCandless
Joseph McClellan
W. L. McCloy
R. A. McCrea
Jesse Clark McDowell
George R. McKee
William McKee
J. I. McNally
C. A. Machesney
Edwin C. Merrill
D. F. Miller
R R. Miller

Pennsylvania — Continued.

Pittsburgh .... Fred W. Miner
C. S. Mitchell
E. M. Moore
Lee C. Moore
P. A. Moran
John J. Murray
A. J. Newman
Thomas Nicoll
John Ostermaier
A. B. Patterson
William M. Patterson
Christy Payne
James G. Pew
John G. Pew
Charles E. Pratt
S. C. Preston
H. A. Quay
William S. Ralston
Harvey Rankin
George W. Ratcliffe
J. A. Reed
James H. Reed
J. H. Reed, Jr.
W. G. Reel
E. B. Reeser
Harry C. Reeser
George N. Riley
D. Robertson
H. P. Roby
M. Romano
E. S. Rooney
Willard J. Rowland
C. H. Rupp
Louis I. Sands
John H. Schalck
W. F. Schell
M. C. Schneider
J. W. Shay
John C. Sheppard
J. M. Simpson
Elmer Smith
H. L. Smith
W. H. Spain
W. A. Sprenkle

Pennsylvania — Continued.

Pittsburgh	A. E. Staniek
	S. B. Stewart
	William Stewart
	George J. Stuart
	T. O. Sullivan
	J. Roy Tanner
	Edgar Thomas
	Adam Tomer
	John B. Tonkin
	E. M. Treat
	J. C. Trees
	William B. Way
	H. W. Wentzell
	E. P. Whitcomb
	J. B. Wikoff
	George Wittmer, Jr.
	Henry Wittmer
	Thomas Wittmer
	R. B. Woodworth
	W. H. Young
	C. W. Zimmerman
Portage	J. A. Sloan
Port Allegany	T. A. Dumm
	J. W. Farner
	A. B. Flint
	F. A. French
	D. H. Phillips
	W. H. Richards
Reynoldsville	C. O. Berg
Ridgway	C. H. Law
Roulette	L. E. H. Brown
	William A. Ditto
St. Marys	Philip Dixon
Saxonburg	Emil Rudert
Sharon	J. P. Curry
	S. W. Snyder
Sharpsburg	S. H. Eastland
Shinglehouse	S. F. Goble
	W. M. Holly
	J. H. Isherwood
	A. J. Swarm
Sigel	Grant West
Smethport	Peter Fay
	Louis E. Sterrett

Pennsylvania — Continued.

South McConnellsville	William F. Richter
Tarentum	L. R. Silliman
Ten Mile Bottom	F. A. Cross
Tidioute	B. L. Miller
Titusville	George F. Fleming
	W. T. Funk
	Robert S. Hampton
	F. C. Hanchett
Turtle Creek	J. F. Bulger
	C. R. Dietrich
Uniontown	F. L. Garard
	H. D. Hutchinson
	L. L. Miller
Van	J. P. Mansfield
Warren	W. B. Clawson
	W. H. Filler
	George W. Hickernell
	James W. Kitchen
	C. P. McCalmont
	H. H. McConnell
	H. M. Prill
	L. L. Wood
Washington	George F. Drury
	A. D. Kightlinger
	J. W. Leonard
	Henry Martin
	William O'Brien
	Hose Schaffer
	W. P. Simmons
	Patrick Yorke
Waynesburg	C. E. Dittman
	J. L. Fye
	John Glass
	W. E. Nestor
	Albert Rush
	P. A. Troutman
Westfield	A. A. Presho
Wilkinsburg	W. G. Ketler
	J. W. Kidd
	George A. Kinley
	J. A. Lambing
	Harry Porterfield
	William Reichert

Pennsylvania — Concluded

Woodlawn	Arthur McClellan
	George L. Ratcliffe

Rhode Island.

Providence	George S. Barrows

Texas.

Abilene	George H. Caffrey
Atlanta	W. E. Sipe
Corpus Christi	D. C. DeWitt
	C. A. Schwarm
Corsicana	E. R. Brown
Dallas	J. E. Hutchinson
	H. E. Manley
	H. C. Morris
	R. G. Soper
Denison	T. W. H. Flinn
	C. B. McKinney
Fort Worth	L. E. Barrows
	W. P. Gage
	D. P. Harrington
	F. W. Kirk
	O. K. Shannon
Gainesville	W. L Milne
Grossbeck	R. L. Underwood
Laredo	M. P. Cullinan
Marshall	W. H. Sedberry
Mexia	E. J. Anderson
Moran	H. W. Brennan
	Joseph Merket
Petrolia	C. M. Baker
Port Arthur	J. S. Connelly
Wichita Falls	W. C. Gibson

West Virginia.

Branchland	L. P. McAllister
Bridgeport	French Nicholsen
Charleston	R. G. Altizer
	A. M. Ballard
	George R. Carpenter
	Frank Cox
	C. S. Duffield
	John C. Ford
	J. E. Frazier

West Virginia — Continued

Charleston	William Freudenberger
	F. P. Grosscup
	Paul B. Grosscup
	Geo. F. Hennessey
	D. C. Jay
	D. A. Ketchum
	Robert Lockhart
	W. C. Marckworth
	C. O. McDowell
	R. N. Parks
	J. W. Penhale
	J. L. Perdue
	Edward Sackett
	L. A. Seyffert
	P. C. Sloane
	A. C. Smith
	George E. Taylor
	H. A. Wallace
	James B. Weir
	W. W. Wolfe
Clarksburg	W. F. Alexander
	S. W. Bowman
	David J. Carter
	H. C. Cooper
	D. W. Cork
	Filmore C. Devericks
	R. F. Dolen
	J. J. Evans
	Wallace B. Gribble
	F. B. Haymaker
	Boyd E. Horner
	Lynn S. Horner
	Howard Jenkins
	L. G. Kincheloe
	W. C. McMasters
	J. F. McNary
	John Mowery
	T. B. Peddicord
	Ernest Randolph
	Charles C. Reed
	Bert Singleton
	H. L. Snyder
	John H. Williams
Clendenin	T. R. Cartwright

West Virginia — Continued	
Clendenin	L. V. Koontz
Dawes	A. R. Rich
Fairmont	Curtis B. Fleming
	G. H. Jackson
	Nicholas Powers
	F. B. Pryor
	Edwin Robinson
Fairview	Lon Lavell
Farmington	C. B. Bormann
Grafton	T. W. Angle
Hastings	C. W. Brooks
	Roy Glass
Hundred	T. J. White
Huntington	D. E. Abbott
	E. G. Burns
	O. L. Davies
	G. I. Gassdorf
	E. J. Greenwalt
	J. F. Kent
	E. J. King
	J. T. McClintock
	James P. McCloskey
	John J. Nash
	Raymond J. Nash
	G. A. Northcott
	G. H. Reckard
	J. W. Reeser
Kenova	Deo Jimerson
Kermit	R. C. Leard
Littleton	J. P. Campbell
	R. J. Clarkson
McWhorter	W. J. Droppleman
Mannington	Claude M. Fleming
	R. B. Howard
	Thomas J. Jones
	W. T. Smith
Miami	L. D. Ikard
Middlebourne	T. C. Kingsley
Miletus	W. N. Baker
Morgantown	A. T. Casto
	D. H. Courtney
	D. T. Dusenberry
	Jesse J. Hall
	W. E. Hunter

West Virginia — Continued

Morgantown	Clement Ross Jones
	J. H. McDermott
	W. H. South
	Israel C. White
Moundsville	F. O. Funk
	George M. Luther
	S. W. Meals
Parkersburg	T. B. Burns
	J. T. Callanan
	David B. Crawford
	John M. Crawford
	Herman B. Hogg
	A. E. Kenney
	Edward B. Rich
	Wade H. Tonkin
	E. W. Williamson
Peytona	C. L. Short
Ransom	John B. Brazier
St. Albans	R. N. Sargent
St. Marys	A. I. Sutton
Salem	M. L. Campbell
	J. E. Franier
	J. K. Swartz
Sistersville	J. W. Cushing
	F. W. Martin
Smithfield	George B. Meredith
Smithville	I. D. Frantz
	David White
Spencer	Jay Geist
	J. F. Geist
	A. S. Heck
	T. F. O'Brian
Weston	Henry Brewster
	C. C. Dunham
	G. L. Hinerman
	James J. Logue
	Edward P. McCall
	J. H. McGilvary
	L. McNary, Jr.
	William L. Sheets
	J. W. Taylor
	W. A. Williams
	J. W. Wilson
West Union	F. S. Hazlett

West Virginia — Concluded

West Union	John C. Stitt
Wheeling	John Duncan
	A. S. Hare
	Paul Luebecker
	J. F. Nestor
	George B. Riddle
Wilsonburg	K. H. Bane
	Charles Caveneau

Wisconsin.

Milwaukee	A. O. Rutz
	J. C. Wilson

CANADA.

Alberta.

Calgary	R. L. Bevan
	Dillon Coste
	Eugene Coste
	Stuart W. Davies
	F. J. Heuperman
	W. E. Larkham
	Porter D. Mellon
	A. I. Payne
	H. B. Pearson
	C. H. Spencer
	H. S. Tims

New Brunswick.

Moncton	E. A. Cummings

Ontario.

Brantford	W. E. Howard
Caledonia	B. N. Berry
Chatham	R. L. Pattinson
	W. G. Ryan
	F. D. Wittorski
Dunville	Roy Lindsay
Essex	C. J. Near
Galt	W. J. Marriott
Hamilton	H. W. Braden
	A. F. Covey

Ontario — Concluded

Hamilton	Clarence H. Grace
	T. A. Hall
	A. G. May
	John B. McNary
Ingersoll	M. D. Montgomery
Kingsville	M. J. Roberts
	George Scratch
London	James C. Duffield
	Frank B. Tomb
	James M. H. Young
Merlin	Glenn N. Gale
	Lloyd Stroup
	David H. Tucker
Niagara Falls	D. A. Coste
Port Alma	John Stroup
Reymer	J. B. Bower
Rodney	George Bullock
St. Catherines	W. B. Davies
	William B. Davies
St. Thomas	J. E. McCrimmon
	C. C. Roberts
Sarnia	John B. Williams
Simcoe	Harrison Stringer
Toronto	W. W. Near
Vienna	J. W. Howard
Windsor	R. B. Kilpatrick
	Gordon D. Wickett
Woodstock	James A. Doherty
	H. Fulsom

ENGLAND.

London	Arthur Graham Glasgow
	James A. L. Henderson
	Campbell M. Hunter

HOLLAND.

Amsterdam	E. D. Pyzel

HUNGARY.

Budapest	Jacques Kanitz

SOUTH AMERICA.

Argentine.

Buenos Aires .... President, General
Explotacion del Petroleo de Comodore Rivadava.

SUMMARY OF GEOGRAPHICAL DISTRIBUTION.

Alabama	2	New York	129
Arkansas	15	Ohio	297
California	13	Oklahoma	60
Connecticut	3	Pennsylvania	414
District of Columbia	2	Rhode Island	1
Illinois	21	Texas	26
Indiana	11	West Virginia	149
Kansas	27	Wisconsin	2
Kentucky	12	Calgary, Canada	11
Louisiana	19	New Brunswick, Canada....	1
Maryland	2	Ontario, Canada	39
Massachusetts	3	England	3
Michigan	8	Holland	1
Missouri	21	Hungary	1
New Jersey	2	Argentine, South America..	1
		Total	1296

THE ASSOCIATION OF NATURAL GAS SUPPLY MEN

OFFICERS 1917-1918.

President

David O. Holbrook............Natural Gas Association, Pittsburgh, Pa.

Vice President

William B. Way.........Ludlow Valve Mfg. Company, Pittsburgh, Pa.

Treasurer

Thomas C. Clifford.....Pittsburgh Meter Company, East Pittsburgh, Pa.

Secretary

Larmour Adams........................Metric Metal Works, Erie, Pa.

Directors

W. K. Hughes.............Continental Supply Company, St. Louis, Mo.
W. B. Patterson.............Frick & Lindsay Company, Pittsburgh, Pa.
R. A. McKinney......Manhattan Rubber Mfg. Company, Passaic, N. J.
F. R. Hutchinson............Gas Appliance Company, Cleveland, Ohio.
F. W. Miner................National Supply Company, Pittsburgh, Pa.
Wm. McKee...........Chaplin-Fulton Mfg. Company, Pittsburgh, Pa.
L. F. Hamilton................National Tube Company, Pittsburgh, Pa.
D. O. Holbrook...............Natural Gas Association, Pittsburgh, Pa.
T. C. Clifford..........Pittsburgh Meter Company, East Pittsburgh, Pa.
Larmour Adams.......................Metric Metal Works, Erie, Pa.
O. F. Felix..................Equitable Meter Company, Pittsburgh, Pa.
W. B. Glover...............Oil Well Supply Company, Pittsburgh, Pa.
B. T. Bechtel.......................Mark Mfg. Company, Chicago, Ill.
W. B. Way..............Ludlow Valve Mfg. Company, Pittsburgh, Pa.
E. S. Rooney......Youngstown Sheet & Tube Company, Pittsburgh, Pa.

DIRECTORY OF MEMBERSHIP

Ajax Iron Works............Corry, Pa.
Allegheny Steel Co............Pittsburgh, Pa.
Anchor Packing Co............Pittsburgh, Pa.

Bessemer Gas Engine Co............Grove City, Pa.
Borden Company............Warren, Ohio
Bristol Co., The............Waterbury, Conn.
Broderick & Bascom Rope Co............St. Louis, Mo.
Bryant Heater & Mfg. Co............Cleveland, Ohio
Builders Iron Foundry............Providence, R. I.
Byers, A. M. Co............Pittsburgh, Pa.

Carnegie Steel Co............Pittsburgh, Pa.
Chaplin-Fulton Mfg. Co............Pittsburgh, Pa.
Cincinnati Rubber Mfg. Co............Cincinnati, Ohio
Clark & Norton Mfg. Co............Wellsville, N. Y.
Cleveland Gas Meter Co............Cleveland, Ohio
Colona Mfg. Co............Pittsburgh, Pa...
Columbia Gas Stove Co............Huntington, W. Va.
Columbian Rope Co............Auburn, N. Y.
Columbus Heating & Ventilating Co............Columbus, Ohio
Continental Supply Co............St. Louis, Mo.
Cooper, C. & G. Co............Mt. Vernon, Ohio
Crandall Pettee Co............New York City

Davis-Bournonville Co............Jersey City, N. J.
Dayton Pipe Coupling Co............Dayton, Ohio
Davison, N. C., Gas Burner & Welding Co............Pittsburgh, Pa.
Draeger Oxygen Apparatus Co............Pittsburgh, Pa.
Dresser, S. R., Mfg. Co............Bradford, Pa.

Equitable Meter Co............Pittsburgh, Pa.
Erie Trailer Mfg. Co............Erie, Pa.
Estate Stove Co............Hamilton, Ohio

Fitler, Edwin H. Co............Philadelphia, Pa.
Foxboro Co., The............Foxboro, Mass.
Franklin Co., The............Canton, Ohio
Frick & Lindsay Co............Pittsburgh, Pa.
Fuel Oil Journal............Houston, Texas

Garlock Packing Co....................................Palmyra, N. Y.
Gas Age, The...New York City
Gas Appliance Co....................................Cleveland, Ohio
Gas Record..Chicago, Ill.
General Fire Extinguisher Co.......................Providence, R. I.
Germer Stove Co.......................................Erie, Pa.
Goodrich, B. F. Co.....................................Akron, Ohio
Graves Supply Co......................................Cincinnati, Ohio
Gwynn Gas Burner & Eng. Co.........................Pittsburgh, Pa.

Hammon Coupler Co...................................Pittsburgh, Pa.
Haymond Co..Muncie, Ind.
Hays Mfg. Co...Erie, Pa.
Hazard Mfg. Co..Chicago, Ill.
Heeter, C. M. Sons & Co., Inc.......................Butler, Pa.
Hewitt Rubber Co......................................Pittsburgh, Pa.
Hooven, Owens, Rentschler Co.......................Hamilton, Ohio
Hope Engineering & Supply Co.......................Pittsburgh, Pa.

Ideal Heating Co., The................................Columbus, Ohio
Ingersoll-Rand Co. ....Pittsburgh, Pa.
International Hale Gas Mixer Mfg. Co..............Detroit, Mich.

Jarecki Mfg. Co..Erie, Pa.
Jiffy Water Heater Co.................................St. Louis, Mo.
Jones & Laughlin Steel Co...........................Pittsburgh, Pa.

LaBelle Iron Works....................................Steubenville, O.
Lattimer-Stevens Co., The............................Columbus, O.
Leschen, A. & Sons Rope Co..........................St. Louis, Mo.
Lezius Automatic Draft Regulator Co...............Cleveland, O.
Lucey Mfg. Corporation...............................Pittsburgh, Pa.
Ludlow Valve Mfg. Co.................................Pittsburgh, Pa.

Macomber & Whyte Rope Co..........................Kenosha, Wis.
Manhattan Rubber Mfg. Co...........................Passaic, N. J.
Mark Mfg. Co..Chicago, Ill.
Maxon Premix Burner Co..............................Muncie, Ind.
Meek Oven Mfg. Co...................................Newburyport, Mass.
Metric Metal Works....................................Erie, Pa.
Minneapolis Heat Regulator Co......................Minneapolis, Minn.
Modern Iron Works.....................................Quincy, Ill.
Modern Safety Gas Iron Co...........................Philadelphia, Pa.
Moon Mfg. Co., The....................................Chicago, Ill.
Moore, Lee C. & Co., Inc.............................Pittsburgh, Pa.

Moser Mfg. Co....................Kane, Pa.
Mueller, H. Mfg. Co....................Decatur, Ill.

Nathan Mfg. Co....................New York City
National Supply Co....................Pittsburgh, Pa
National Transit Pump & Machine Co....................Oil City, Pa.
National Tube Co....................Pittsburgh, Pa.
Natural Gas Journal....................Buffalo, N. Y.
New Bedford Cordage Co....................New York City
New York Belting & Packing Co....................New York City
Nye, A. T. & Son Co....................Marietta, O.

Oil & Gas Journal....................Tulsa, Okla.
Oil City Boiler Works....................Oil City, Pa.
Oil Well Supply Co....................Pittsburgh, Pa.
Oxweld Acetylene Co....................Chicago, Ill.

Parkersburg Machine Co....................Parkersburg, W. Va.
Parkersburg Rig & Reel Co....................Parkersburg, W. Va.
Peerless Heater Co....................Pittsburgh, Pa.
Pennsylvania Furnace & Stove Co....................Warren, Pa.
Pittsburg Meter Co....................E. Pittsburgh, Pa.
Pittsburgh Reinforced Brazing & Mach. Co....................Pittsburgh, Pa.
Pittsburgh Valve & Fittings Co....................Pittsburgh, Pa.
Pittsburgh Valve, Foundry & Const. Co....................Pittsburgh, Pa.
Pittsburgh Water Heater Co....................Pittsburgh, Pa.
Plymouth Cordage Co....................N. Plymouth, Mass.
Pratt & Cady Co., Inc....................New York City
Pritchard Supply Co....................Mannington, W. Va.

Reid, Jos. Gas Engine Co....................Oil City, Pa.
Reliable Stove Co....................Cleveland, O.
Republic Iron & Steel Co....................Youngstown, O.
Revere Rubber Co....................Chelsea, Mass.
Reznor Mfg. Co....................Mercer, Pa.
Riesenman Mfg. Co., Ltd....................Franklin, Pa.
Robinson, J. E. & Co....................Oil City, Pa.
Robinson Packer & Machine Co....................Coffeyville, Kan.
Roebling, John A. Sons Co....................Trenton, N. J.
Rossendale-Reddaway Belting & Hose Co....................Newark, N. J.
Ruud Mfg. Co....................Pittsburgh, Pa.

Sanitary Co. of America....................Linfield, Pa.
Schaeffer & Budenberg Mfg. Co....................Pittsburgh, Pa.
Scientific Heater Co The....................Cleveland, O

Selas Co. ....Canton, O.
Solar Light Co..New York City
South Chester Tube Co.....................................Chester, Pa.
Spang, Chalfant & Co......................................Pittsburgh, Pa.
Sprague Meter Co..Bridgeport, Conn.
Strause Gas Iron Co.......................................Philadelphia, Pa.
Superior Gas Engine Co....................................Springfield, O.

Tate-Jones & Co., Inc.....................................Pittsburgh, Pa.
Taylor, W. P. Co..Buffalo, N. Y.
Toledo Pipe Threading Machine Co..........................Toledo, O.
Troop Mfg. Co...Pittsburg, Pa.

United Seal Co..Columbus, O
Utica Valve & Fixture Co..................................Utica, N. Y.

Welsbach Co. ....Gloucester City, N. J.
Westinghouse Machine Co...................................Pittsburgh, Pa.
Wheeling Steel & Iron Co..................................Wheeling, W. Va.
Wolfe, Linden W...Oil City, Pa.
Worthington Pump & Machinery Corp..........................Buffalo, N. Y.
Wright Wire Co..Worcester, Mass.

Youngstown Sheet & Tube Co................................Youngstown, O.